MARCH, 1955

TOOLING and PRODUCTION

The Magazine of Manufacturing Management

OUR 20th ANNIVERSARY YEAR

EDITORIAL: Q-C rides herd on cost cutting

•

TALK OF THE MONTH: Recent Developments in Surface Finish Standards

•

CAPITAL INVESTMENT Is Economical Way To High Product Quality

•

Machining Magnesium

•

Fabricating the Aluminum-Coated Steels

•

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•

A New Muscle for Industry's Use

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TOOLING and PRODUCTION

The Magazine of Manufacturing Management

formerly Tool-Die-Machine PROGRESS 1934-1941
TOOL & DIE JOURNAL 1941-1951

George J. Huebner, Founder

VOL. XX—No. 12 MARCH, 1955

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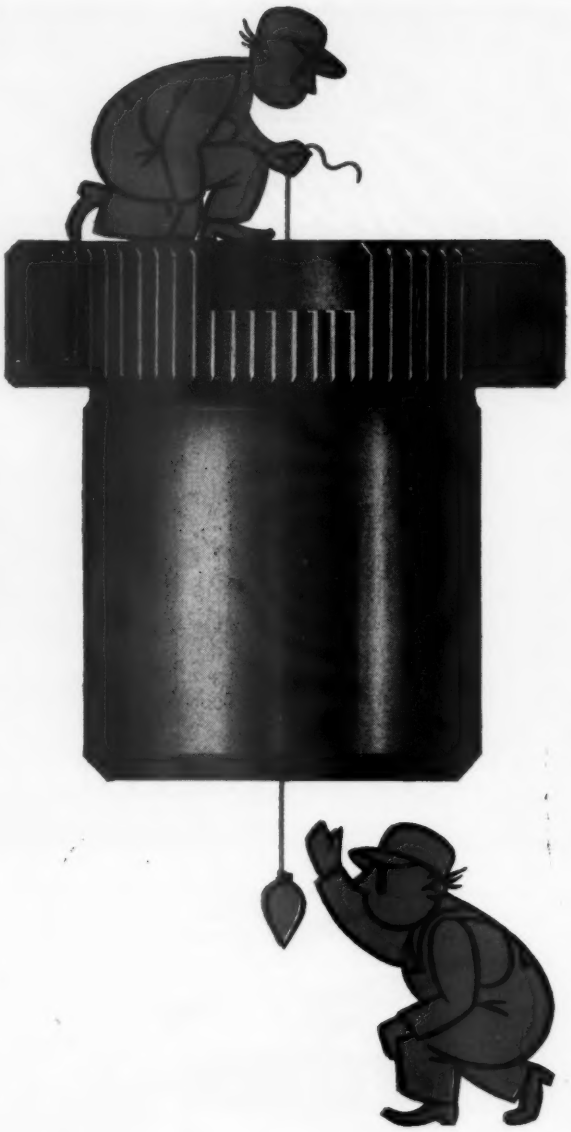

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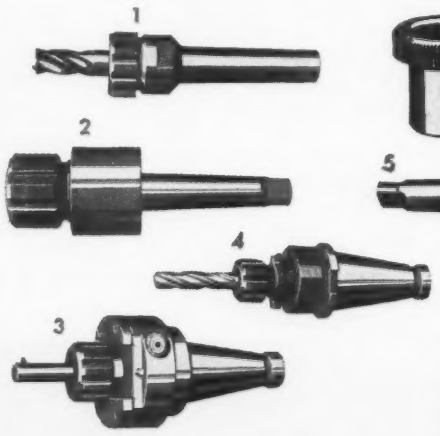

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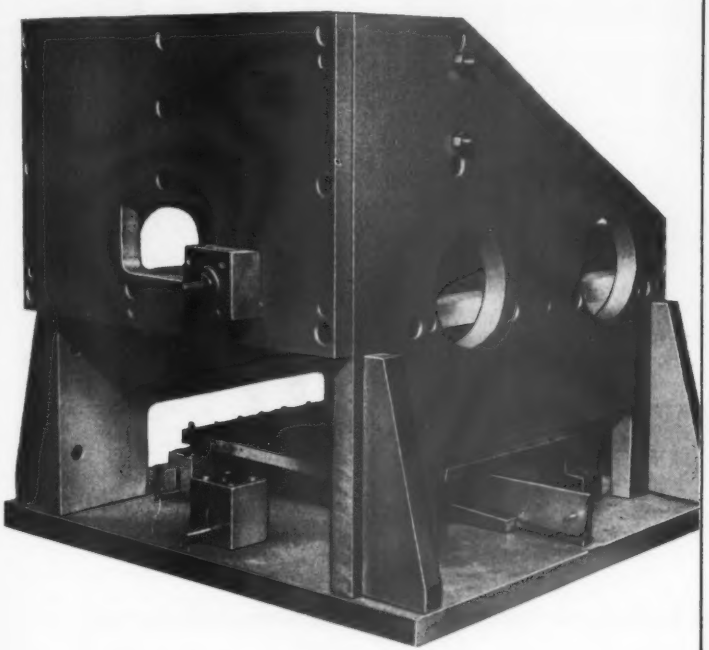

by
J. H. Matheny
co-owner
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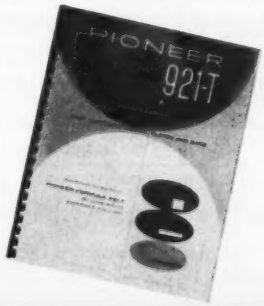

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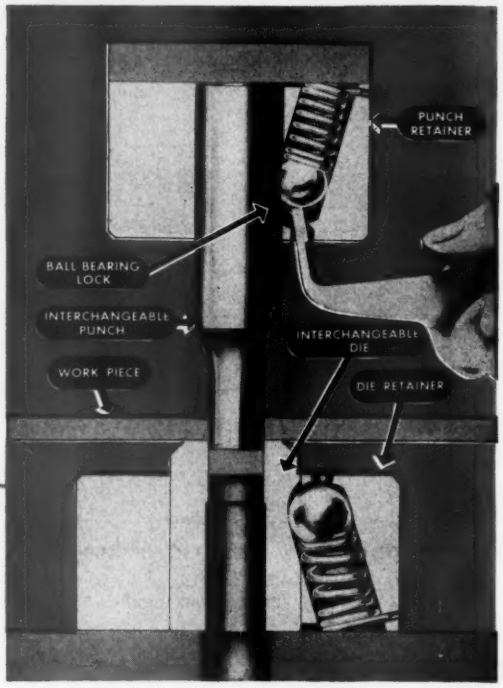
HOW R-B PUNCHES OPERATE



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Talk of the Month

★ ★ ★ ★ ★ ★ ★ ★

RECENT DEVELOPMENTS IN SURFACE FINISH STANDARDS*

by Roy P. Trowbridge
Standards Engineer
Engineering Standards Section
GENERAL MOTORS CORPORATION
Detroit, Michigan

In some respects the history of surface finish standardization in this country may be likened to the old time silent movie, "The Perils of Pauline." There has been plenty of action and at times a seemingly endless series of setbacks involving insuperable odds. However, as in Pauline's experiences, everything has turned out all right and the prospect is that any further standardization efforts in this field will be comparatively tranquil.

Development of The American Standard of Surface Finish

In the early 30's, increasing industrial interest in the subject of surface finish prompted the ASA to authorize the organization of Sectional Committee B46 for standardization of classification and designation of surface qualities. Until that time, there had been very little effort to correlate surface finish data, and in most industries a master mechanic or skilled machinist decided all questions regarding surface finish characteristics required for specific applications.

. . . *Continued on page 12*

*Mr. Trowbridge's talk is from the published proceedings of the Fifth National Conference on Standards held in New York last November. It is reproduced here by kind permission of the American Standards Association. The entire proceedings, constitute a 100-page volume, entitled "Standards for a Strong America," which is available from the American Standards Association, 70 East 45th Street, New York 17, at $3.00.

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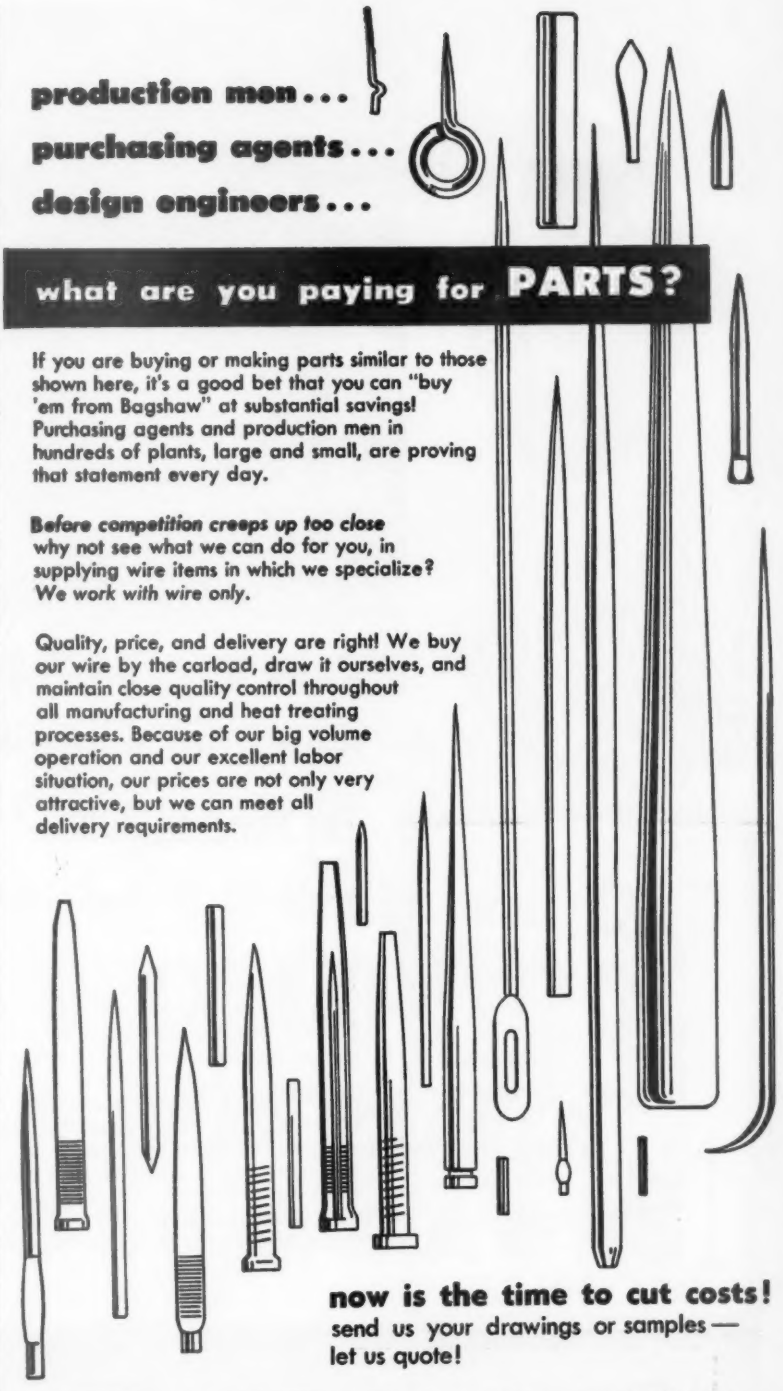

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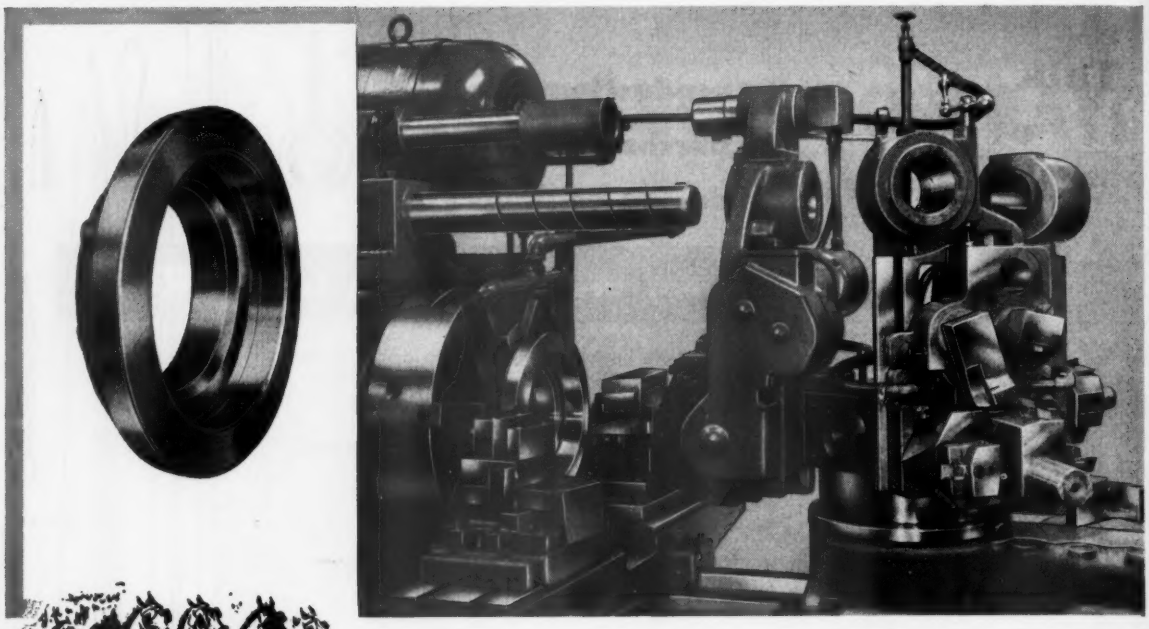
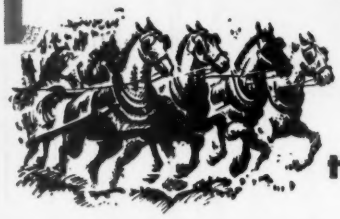
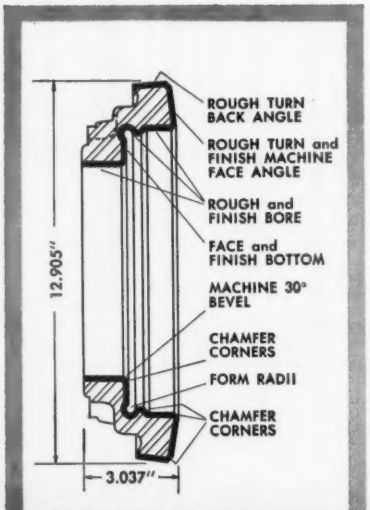




FORTY HORSES "pulled the team" that made this bevel gear blank



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CIRCLE INFORM-A-GRAM KEY NO. 12

. . . Month's Talk, from page 9

That the subject was controversial and not any too well understood is attested to by the fact that it was not until 1940 that a proposed American Standard was released for a trial period of two years. Seven more years elapsed before the first approved American Standard was released as American Standard Surface Roughness, Waviness and Lay, B46.1-1947. During the long development period the understanding of surface characteristics was greatly enhanced by the research of Dr. Abbott in this country, Dr. Schlessinger in England, and Herr Gustav Schmalz in Germany. If it had not been for the tireless efforts of men such as these, standardization of surface characteristics could never have been accomplished.

Strengths and Weaknesses of B46 · 1

The American Standard B46.1-1947 in some respects was the result of a compromise of conflicting opinions. Nevertheless in other respects it represented a reconciliation of opinions and practices, and it clarified the objectives of the project and defined its scope and the terms describing and controlling surface characteristics. It also established symbols and a series of values for specifying roughness, waviness, and lay on engineering drawings. In time it was recognized that the major weakness of the standard was its multiplicity of methods for rating roughness. Four different ratings were allowed, which made it necessary to qualify and supplement any specified roughness by the units or method of rating.

Another shortcoming of B46.1 was its lack of an accurate means of calibrating instruments so that readings and surface comparisons would be reproducible on different instruments and by different operators. Non-uniformity of instrument readings and operator technique was impressively demonstrated at a conference and exhibit at a government arsenal where readings of a multiplicity of instruments of the same make and different makes were compared and tabulated. Readings of instruments of the same make showed variations up to 150%. To establish better uniformity

. . . Continued on page 16

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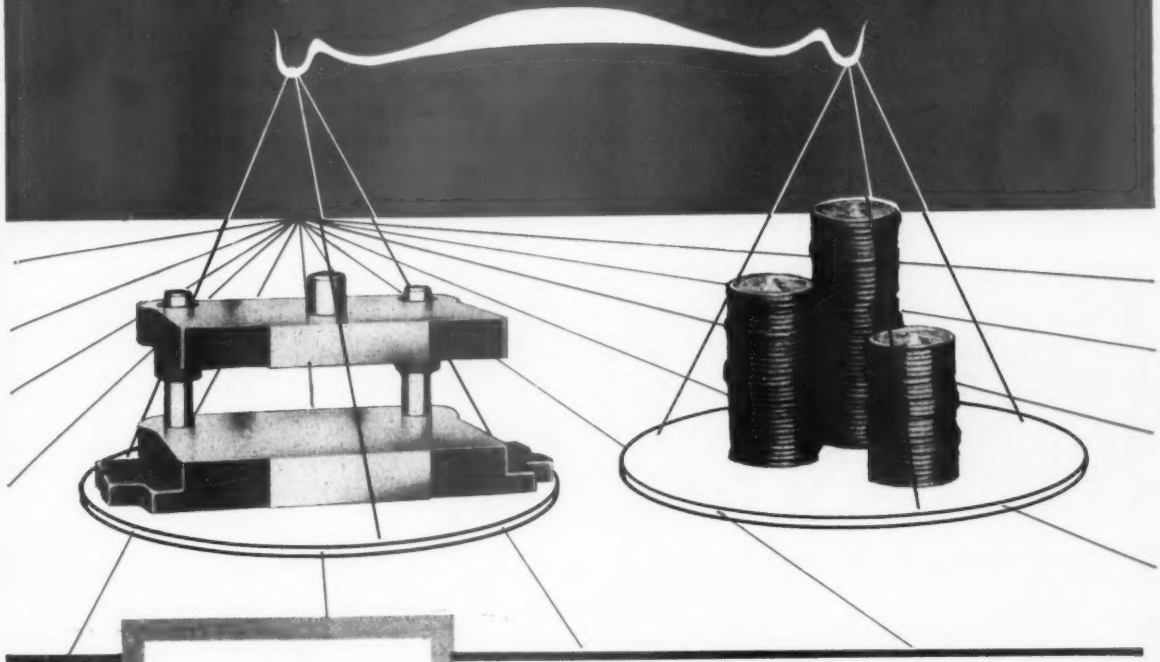

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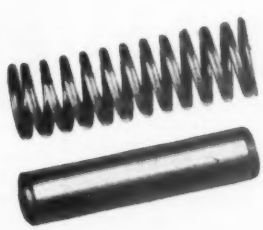

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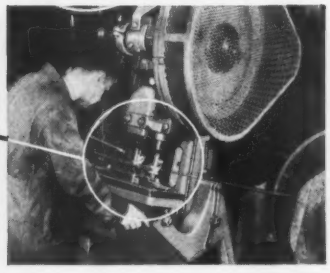
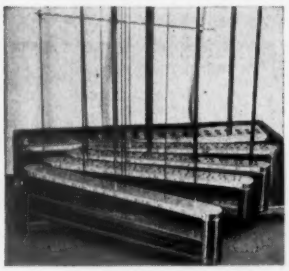
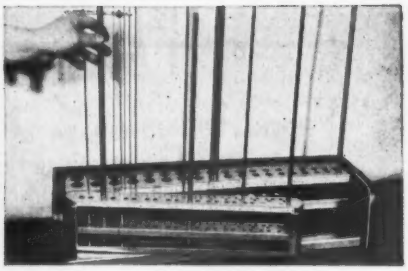


Eliminate wear on your die sets with these leader pin oilers. Acro Pin Oilers, as illustrated, fit over each leader pin and seals in place with a rubber neoprene washer. Each cup is filled with oil so each downward stroke brings bushing in contact with oil and each upward stroke distributes oil evenly over leader pins. Eliminate bushing wear, leader pin scoring, and maintain die accuracy. Die sets equipped with Acro Pin Oilers have run under tests for several weeks to a month without refilling.

DRILL ROD RACKS



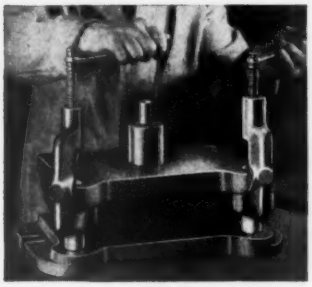


Eliminate trouble and waste effort with this modern method of storing drill rod. Put the Acro rack in a central location of each department and make it simple for each mechanic to select correct rod size in a hurry. It also provides a visual inventory for checking rod replacements.

Accommodates 26 letter sizes, 52 pieces; 47 fractional sizes, 138 pieces; 60 number sizes, 304 pieces. Fractional sizes graduated in 64ths from 1/32" to 1/2" and in 32nds from 1/2" to 1" included.

Also available in half size with fractions or numbers.

DIE SET PULLERS



The principle of the Acro Die Set Puller is to remove the punch holder from the die shoe by a straight upward pull, whereby punch holder travels upward from die shoe axially, leaving both leader pins simultaneously. This is accomplished only by use of the indexed screw wrenches which act as indicators, controlling the upward travel. This is an exclusive patented Acro feature, found only in Acro Die Set Pullers. Available in three sizes.

Free Data

covering each of these profitable accessories is included in our folder. Write for bulletin TP-55

ACRO

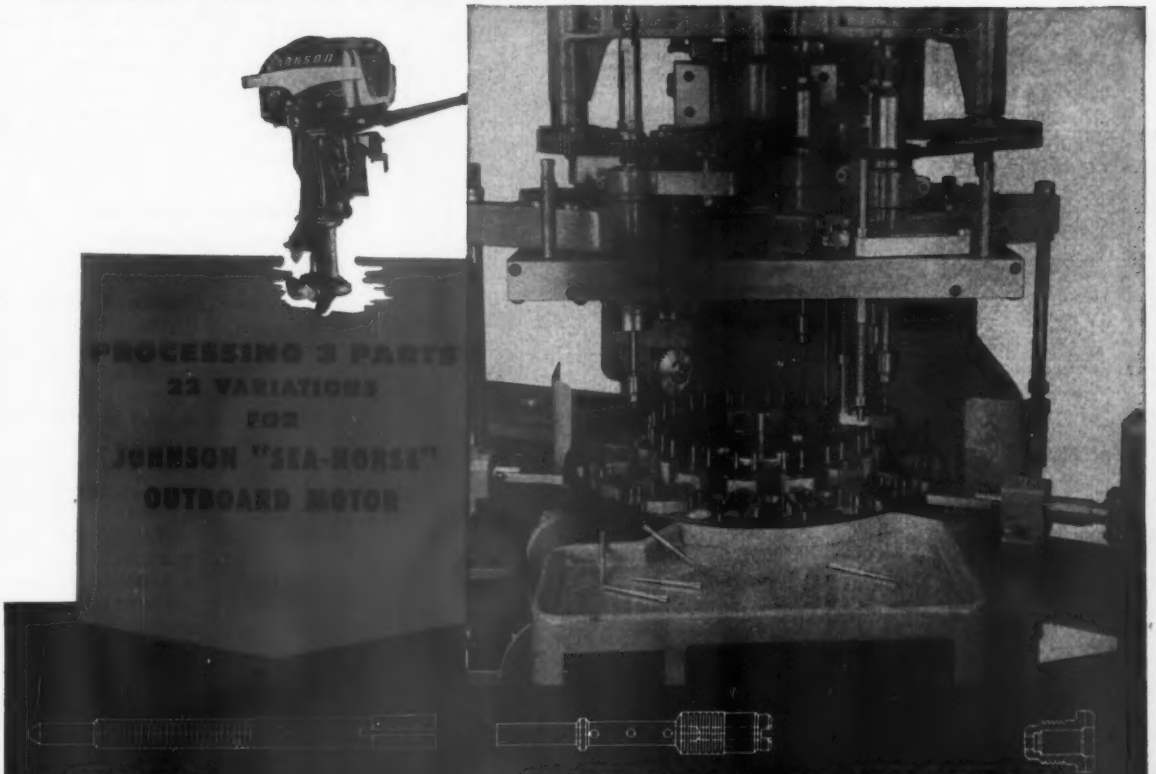
METAL STAMPING CO.

330 EAST RESERVOIR AVE.

MILWAUKEE 12, WIS.

CIRCLE INFORM-A-GRAM KEY NO. 14

Bodine CASE HISTORY NO. 39



1. NEEDLE VALVE:

Drill hole 11/16", deep in top end. Countersink hole to 3/32" dia. 25° included angle. Mill .035" slot 11/16" deep down center axis of hole, vertical milling spindle. Tap hole 6-32 NG-2 to 5/16" deep. Production 750 pieces per hour . . . in 11 lengths . . . 2½" to 4½".

2. HIGH SPEED NOZZLE:

(Vertical milling spindle removed; horizontal spindle substituted.) Seven different nozzles, 1 to 3 holes of different diameters produced. Meter holes drilled through one side and a hole 13/16" deep in small end of nozzle. Mill 1/16" slot, 1/16" deep in top end of nozzle with horizontal milling spindle. Production, 1500 pieces per hour.

3. FLOAT VALVE SEAT:

Processed with 4 variations in the inside dia. of seat. Two I.D. diameters combination reamed to .004" (T.I.R.) concentricity with clamping dia. Valve seat rough and finish faced, depth tolerance .005". Mill 3/64" slot 1/16" deep (horizontal spindle). Production 1100 pieces per hour.

The three jobs detailed above are produced on the Bodine standard Model No. 41-20 . . . by means of a changeover of two horizontal indexing dials and sets of spacers for the variety of lengths of the needle valves.

All parts are hand fed, automatically positioned and clamped. The needle valves are automatically unclamped and unloaded by hand to protect the needle points. Other products are automatically ejected.

The installation of the vertical (photo above) and horizontal (photo at right) milling spindles with the other tools saved an extra handling on all three jobs.

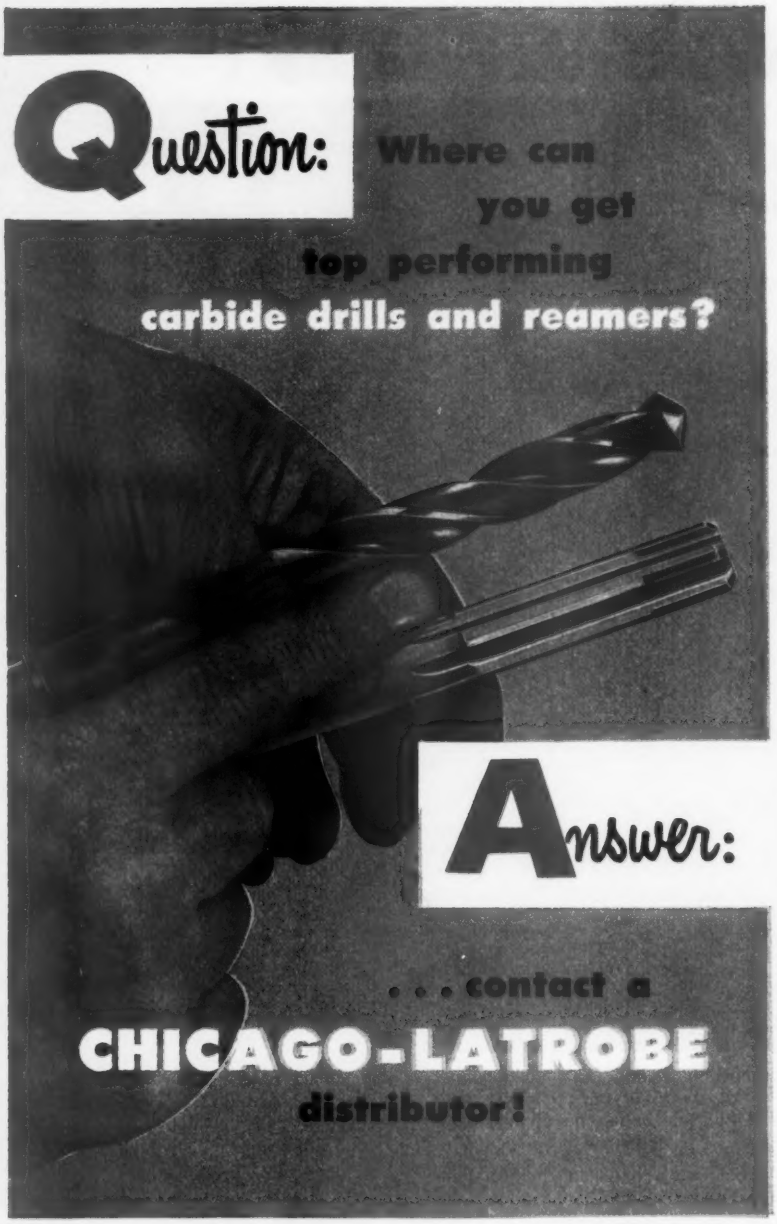
All operations are held to close tolerances. Bodine offers 4 standard-size models which will perform Drilling, Tapping, Milling and Screw Inserting. Operations may be combined as required . . . or machines may be tooled for assembly only, with hopper feed and transfer mechanism for completely automatic production.

Bodine automatics will give you tomorrow's production today. Send us your tough problems . . . we may solve them to your competitive advantage.

Write Dept. TP-3 for the Bodine Case History Brochure.

"You Can't Meet Tomorrow's Competition with Yesterday's Machine Tools"

CIRCLE INFORM-A-GRAM KEY NO. 15



Chicago-Latrobe's vast plant is devoted exclusively to the making of fine drills, reamers, and kindred products. Chicago-Latrobe was one of the pioneers in the manufacture of carbide drills and reamers. This specialization results in the ability to make and deliver better tools. Specify Chicago-Latrobe and you'll see.

Question: How is Chicago-Latrobe service?

Answer: Your CHICAGO-LATROBE Distributor gives you quickest service at lowest cost. Through him you get technical assistance, too!

Ask for Catalog No. 186

DOUBLE CIRCLE TOOLS

Chicago-Latrobe

422 WEST ONTARIO STREET CHICAGO 10

• DRILLS • COUNTERSINKS • CARBIDE TOOLS
• REAMERS • COUNTERBORES • SPECIAL TOOLS

CIRCLE INFORM-A-GRAM KEY NO. 16

. . . Month's Talk, from page 12

in instrument calibration and provide control of reference specimens, a subcommittee of B46 was organized in 1945 to develop a standard or master set of machined surface specimens. The objective of that project was later changed to development of a standard specification for such specimens.

Development of Standard for Physical Specimens of Roughness and Lay

American Standard Physical Specimens of Surface Roughness and Lay, B46.2-1952, comprised not only a standard specification for machined specimens but, in addition, a standard specification for precision geometric specimens which could be produced with much greater accuracy than machined specimens. Thereby controls were afforded for tactual and visual comparison of surfaces with the machined specimens and for uniform calibration of instruments with the precision geometric specimens. The usefulness of both types of specimens is by now well recognized. Since issuance of this standard, the accuracy of the precision reference specimens has been improved and the specification has been revised accordingly in the latest proposed standard. Incidentally, the accuracies specified in the specimen standards assure high quality, uniform surfaces.

Proposed Revision and Consolidation

Almost coincident with publication and release of B46.2, the sectional committee reorganized its subcommittee structure in order to review the entire subject of surface finish, including definitions, classification designation, instrumentation, and specimens. It was proposed to reorganize and consolidate all phases of the subject into one standard publication and to include appendix material of the best information available from qualified technicians in the field of surface quality control to guide the user of the standard.

For approximately two years there was intense activity on the part of the B46 subcommittees, technical committees of the sponsor societies, and task groups in the government services. Information developed by these ac-

. . . Continued on page 21

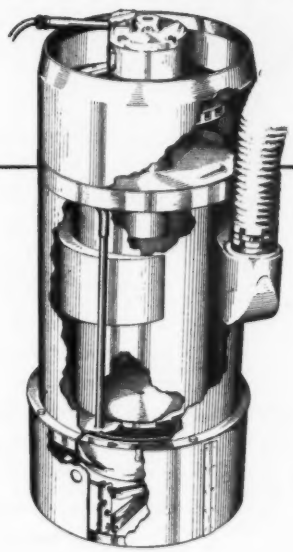
The All New DUSTSNAIRE

Easy to operate — no parts to wear — no bags to change or clean

Compact — takes only 4 sq. ft. floor space — easily portable

100% efficient at all times — no efficiency drop

for "STAR" DUST EXHAUSTER Performance



Guaranteed to remove all particles 5 microns or larger, having a specific gravity of more than 1.5

Abrasive offers to all users of grinding machines for the first time the Feifel DUSTSNAIRE — the scientific answer to the grinding dust problem. May we send you details on this compact, dependable unit? Write for DUSTSNAIRE catalog. Abrasive Machine Tool Company, 16 Dunnellen Road, East Providence 14, Rhode Island.

ABRASIVE
ACCURACY BOOSTS PRODUCTION

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Large, well-balanced stocks of A. S. A. and ACE STANDARD Drill Bushings are readily available in all principal industrial communities. You can get what you want, when you want it—*without delay!*

It's a recognized fact that, dollar-for-dollar you get more downright quality and better service when you Specify ACE—the Drill Bushings that are the "Standard of the Industry" —from Coast-to-Coast.

Write today for catalog containing Technical Data, Comparison Tables, Price Lists and Name of Dealer in your Community.

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WRITE FOR CATALOG F

CIRCLE INFORM-A-GRAM KEY NO. 18

MOORE SPECIAL TOOL COMPANY

Holes, Contours, Surfaces

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc., 726 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.

ACHIEVING PERMANENCE OF ACCURACY

Just as important as the initial accuracy of a precision machine tool is the *life expectancy* of this accuracy. And the most effective way to insure long-lasting accuracy is to give *dimensional stability* and *wear resistance* special consideration during machine design.

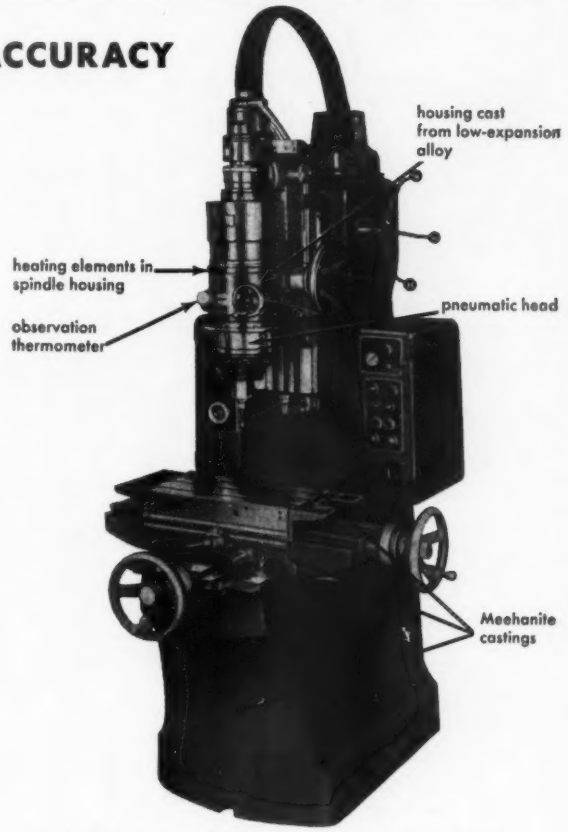
The following causes of dimensional *in*stability are most frequently encountered: thermal expansion, unstable constituents in the material; and stresses in the material. In the design of the No. 2 Moore Jig Grinder, all of these factors were taken into account and special features were incorporated to counteract them.

All the inherent accuracy of a measuring system, capable of positioning the workpiece in relation to the spindle within a tenth, is rendered nearly valueless if the spindle does not retain its position during machining operations. Such movement, caused by thermal expansion, is inevitable unless steps are taken during design to minimize or prevent it.

Electric heating elements were incorporated in the main spindle housing of the Moore Jig Grinder to maintain uniform temperature—whether machine is running or not. An observation thermometer is located so as to indicate any abnormal temperature change within the housing. The housing itself is cast from 36% nickel iron to further minimize effects of temperature variations. And a pneumatic head directs air onto the workpiece, preventing undue temperature rise both in the workpiece and in the locating members of the machine.

Instability resulting from gradual relaxation of locked-in stresses in castings is prevented by suitable stress-relieving cycles during the manufacture of Moore machine components. Similarly, the best way to avoid unstable hardened steel parts is by tempering them. Moore follows this practice.

Further wear resistance was built into the Moore Jig Grinder by means of: adequate way and bearing surface, scientifically proportioned to minimize and distribute wear; all reciprocating parts of nitrided steel—almost as wear-resistant as carbide; pressure lubrication of ways; lead screws and nuts made from nitrided steel and aluminum bronze, respectively, combining to offer low coefficient of friction, abrasion resistance and hardness; and dust protection devices.



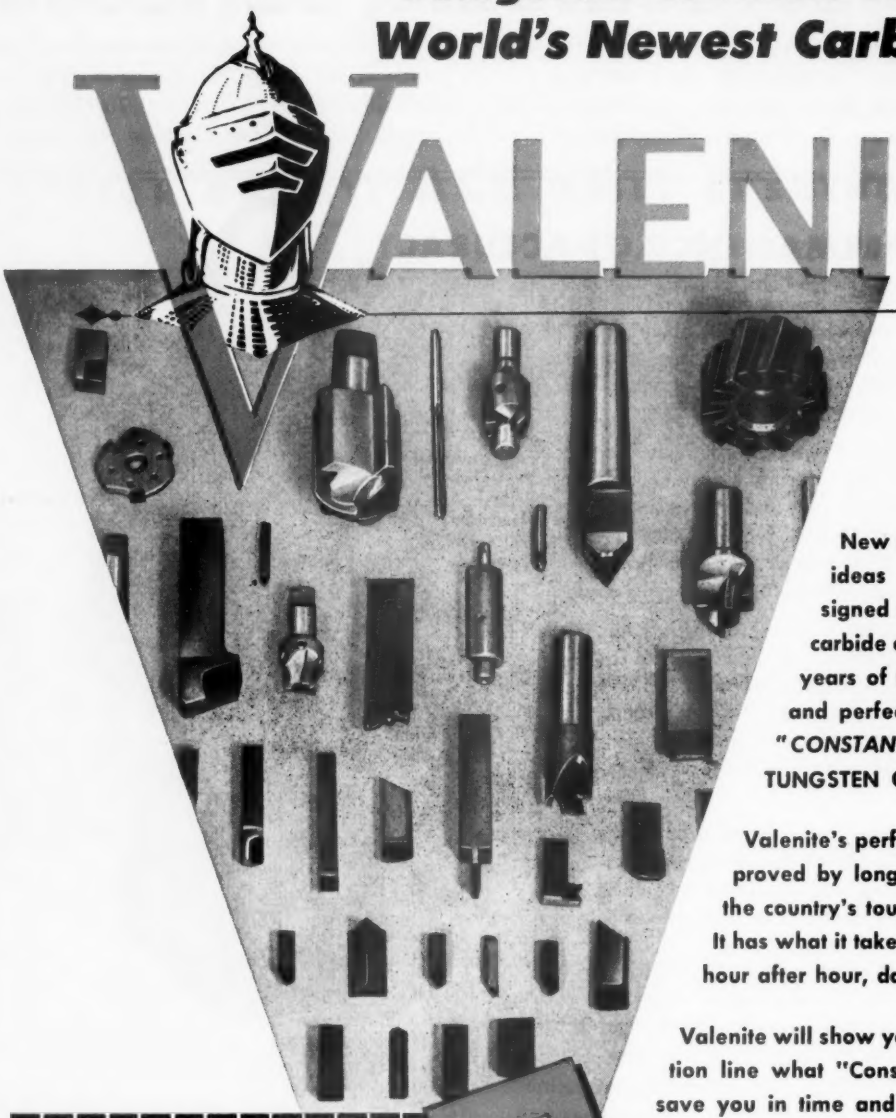
Special design features of the No. 2 Moore Jig Grinder insure permanence of accuracy.

THIS ALL-NEW BOOK WILL HELP YOU ACHIEVE ACCURACY AND ECONOMY

in toolmaking and production — possible only with *engineered methods and equipment*, described fully in HOLES, CONTOURS AND SURFACES. 424 pages, 495 illustrations. 184 pages of Woodworth Coordinate Location Tables from 3 to 100 holes. Price only $5 in U.S.A., $6 elsewhere. Send check or money order to Moore Special Tool Co., Inc., 726 Union Ave., Bridgeport 7, Connecticut.

"Constant Quality" Tungsten Carbide From The World's Newest Carbide Plant

VALENITE



New methods . . . fresh ideas . . . specially designed equipment . . . top carbide engineers . . . three years of thorough planning and perfecting to bring you *"CONSTANT QUALITY"* TUNGSTEN CARBIDE.

Valenite's performance has been proved by long runs on some of the country's toughest cutting jobs. It has what it takes to stand the gaff, hour after hour, day after day.

Valenite will show you on your production line what "Constant Quality" can save you in time and money.

Write for Valenite's complete catalog of "Constant Quality" carbide tips and tools.

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CIRCLE INFORM-A-GRAM KEY NO. 20

... Month's Talk, from page 16

tivities through surveys and otherwise was funnelled into successive redrafts of the B46 standard which were prepared by the B46 Editing Subcommittee under the chairmanship of Joseph Manuele. It is obvious, therefore, that the proposed revisions in their final form reflect an extremely broad concensus; a consensus which beyond any shadow of a doubt reflects the opinions and preferences of an average cross section of American industry.

In final balloting on the proposal, negative votes were cast by a few members based on objections which were subsequently satisfied by minor editorial revisions authorized by the B46 Executive Committee. These included clarification of roughness width as related to roughness-width cut-off and optional simplification of surface symbol by omission of the horizontal extension where specification is limited to roughness height. I was advised last week that the proposed revision had been approved by the sponsor societies and I confidently expect that further steps necessary for its approval and release as an American Standard will be expedited by the American Standards Association.

Important Features of the Proposed Revision

Time will not permit me to give you a detailed explanation of the entire standard as revised. However, I might highlight its more important features. As previously noted, the standard has been expanded. The scope, as it appears in the final draft reads as follows:

1.1 This standard is concerned with the geometric irregularities of surfaces of solid materials, physical specimens for gaging roughness, and the characteristics of instrumentation for measuring roughness. It establishes definite classifications for roughness, waviness, lay, and a set of symbols for drawings, specifications, and reports. In order to assure a uniform basis for measurement, it also provides specifications for precision reference specimens, roughness comparison specimens, and establishes requirements for tracer type instruments. This standard is not concerned with luster, appearance, color, corrosion resistance, wear resistance, hardness, microstructure, and many other characteristics which may be governing considerations in specific applications.

... *Continued on page 24*

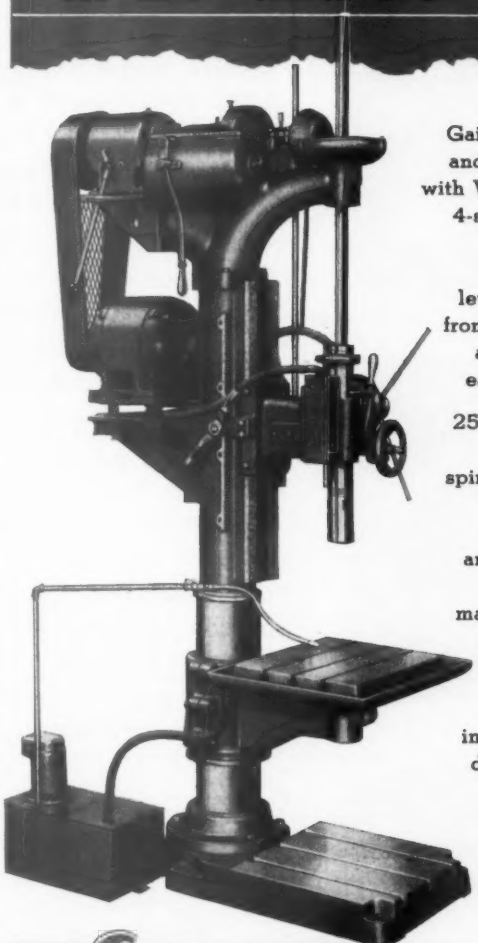
NOTICE

The New

SIBLEY MODEL D

DRILLING MACHINES

in 24" and 28" SWING



Gain greater productivity and operator efficiency—with V-belt drive direct to a 4-speed geared transmission, controlled by a conveniently located lever. 4-station switch at front of machine includes an "inching" button for easy change of speeds.

25" head travel on hand-scraped column; 11" spindle feed; 1-3/4" drilling capacity in mild steel. The heavy table arm assures rigidity and swings on column, to make the machined base accessible for a working surface.

Standard equipment includes automatic spindle stop; geared power feeds; back gears.

Model D-24 Drilling Machine is illustrated complete with coolant pump and fittings, electrical reversing, 3 H. P. motor, magnetic starting switch, and rectangular oil groove table.

SIBLEY

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SOUTH BEND 23, INDIANA

SIBLEY MACHINE & FOUNDRY CORP.
Dept. TP3 , South Bend 23, Indiana
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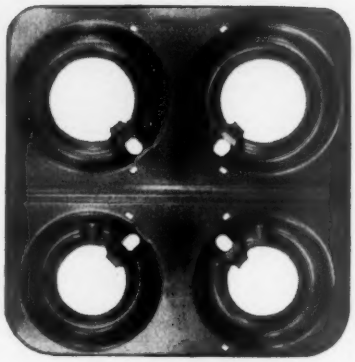
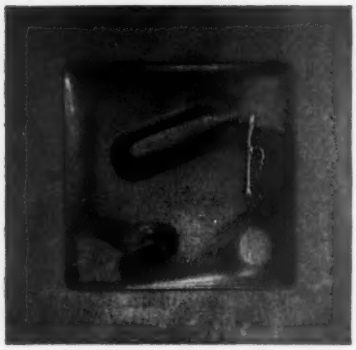
CIRCLE INFORM-A-GRAM KEY NO. 21

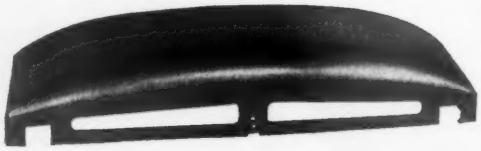
Plastic Low Cost Tooling

For

Dies ... Drill, Welding, and Assembly Jigs







Vulcan, keeping pace with modern tooling, can recommend plastic tooling for medium production on numerous tool programs.

Plastic tools are light in weight, have good impact, compressive strength and dimensional stability. No hand finishing of parts required as galling or marking is eliminated by using plastic form dies.

Contours and odd shapes are cast or laminated to suit individual tools, saving expensive machine and hand finishing operations.

Plastic tools, built in a matter of days instead of weeks, lower your tool costs for those medium production runs.

Our actual production figures prove plastic has a definite place in modern production.

Vulcan Tool Company's organization, building fine tools since 1916, believes new tooling developments must be proved by tool engineers. Since plastic is not a cure-all your problem should be handled by recognized, practical tool men.

Our engineering staff will recommend the correct plastic material and advise if parts of your tooling program should be in plastic.

Send a part print and your production requirements for quotation and recommendations.

Major Vulcan Services . . . Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

VULCAN TOOL CO....PLASTIC TOOL DIVISION

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CIRCLE INFORM-A-GRAM KEY NO. 22

7722 Different Cylinder SELECTIONS—

Miller

AIR AND HYDRAULIC

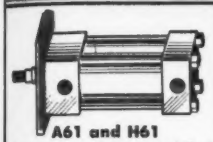
CYLINDERS AND BOOSTERS

"IN STOCK" for immediate delivery

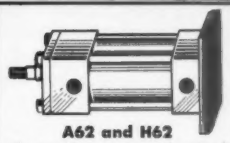
See Miller Bulletins A-105K (Air) and H-104K (Hydraulic) for Complete Dimensions and Engineering Data on these "in-stock" sizes and other Custom Miller Cylinders in bores up to 20" and strokes up to 22 feet.

"IN-STOCK" MODELS

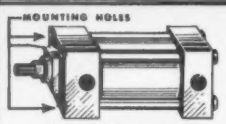
"A" Signifies Miller 250 psi Air Cylinders; "H", 2000 psi Hydraulic Cylinders. Interchangeable Mountings Are Shown In Rod On Drawings.



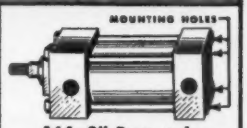
A61 and H61
Flange Mounting on Rod End



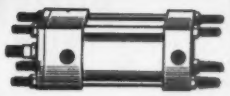
A62 and H62
Flange Mounting on Cap End



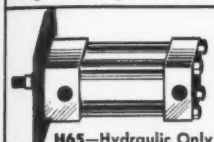
A63—8" Bore only
Flange Mounting on Rod End



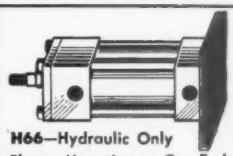
A64—8" Bore only
Flange Mounting on Cap End



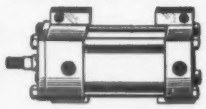
A50 & H50—Tie Rods not extended beyond nuts.
A51 & H51—Tie Rods extended both ends (shown).
A52 & H52—Tie Rods extended. Cap End only.
A53 & H53—Tie Rods Extended. Rod End only.
A54 & H54—Two Tie Rods extended at both ends.



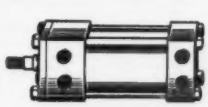
H65—Hydraulic Only
Flange Mounting on Rod End



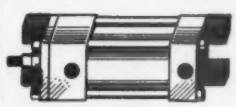
H66—Hydraulic Only
Flange Mounting on Cap End



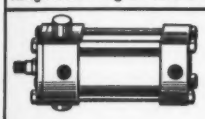
A72 and H72
Side Lug Mounting



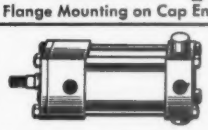
A74 and H74
Side Flush Mounting



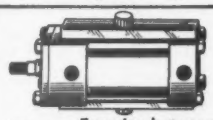
A77 and H77
Side or Foot Mounting



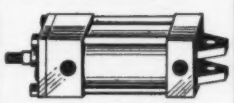
A81 and H81 Trunnion Mounting on Rod End



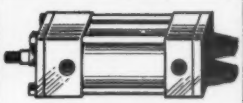
A82 and H82 Trunnion Mounting on Cap End



A83 and H83 Trunnion between Head and Cap (one week delivery)



A84 and H84
Pivot Mounting



A86 and H86
Pivot Mounting

IN STOCK BORES

	BORES	ROD DIA.	ROD TURN DOWN & THREADS	"IN-STOCK" STROKES (in inches)																						
AIR	1½	⅝"	7/16-20	Cushioned																						
				Non-Cush.	1	2	3	4	5	6																
	2	⅝"	7/16-20	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	2½	⅝"	7/16-20	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	3¼	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	4	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	5	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	①
	6	1⅜"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	8	1⅜"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	④
HYDRAULIC	1½	⅝"	7/16-20	Cushioned																						③
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12										②
	2	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	2½	1"	¾-16	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	3¼	1⅜"	1-14	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	4	1¾"	1¼-12	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
	5	2"	1½-12	Cushioned			3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	
				Non-Cush.	1	2	3	4	5	6	7	8	9	10	11	12	14	16	18	20	22	24	28	32	36	

④ ③

① "A" and "H" Models 82, 84 and 86 with strokes over 18" require stop tubes.

Column strength requires larger diameter piston rods for the following:

Air Cylinder Models A82, 84, and 86 with strokes inside area (1), when operated at 100 psi and over;

All hydraulic models with strokes inside area (2) and Models H82, 84, and 86 with strokes in area (4), when operated at 2000 psi and over;

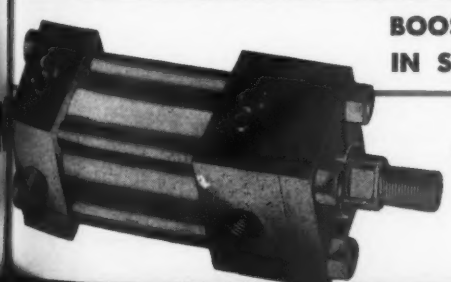
Models H82, 84 and 86 with strokes inside area (3), when operated at 1000 psi and over.

Depending upon Trunnion Pin location, "A" and "H" Models 83 with standard diameter piston rods can have longer strokes than Models 82, 84 and 86.

See Miller File #251 for oversize piston rod and stop tube requirements.

BOOSTERS IN STOCK

Immediate Delivery on the following Miller 25 to 1 Ratio Boosters (80 psi air input produces 2000 psi hydraulic oil output): Model B4, 5" bore, 1" dia. ram, 6" and 12" strokes; Reciprocating Booster Model DA77-RBAB, 5" bore, 1" dia. ram, 6" stroke. Also Booster Tanks, 5" dia., 6" and 10" heights.



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HERE'S WHY—
VLIER Torque Thumb Screws are simple holding tools that give controlled support for even fragile work pieces against machine tool pressures. An automatic ball check in the head prevents further tightening once a pre-determined holding pressure is reached. Thus, no distortion—no rejects. These tools are operated by finger pressure only, and work without fail in noisy, greasy or dark places because they are automatic. Accuracy and uniformity are guaranteed and there is nothing to wear or break. It will pay you to apply VLIER Torque Thumb Screws to your production problem.
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4552 BEVERLY BLVD., LOS ANGELES 4, CALIFORNIA
Distributors of Spring Plungers, Spring Stops, Fixture Keys, Toggle Pads.
CIRCLE INFORM-A-GRAM KEY NO. 24

. . . Month's Talk, from page 21

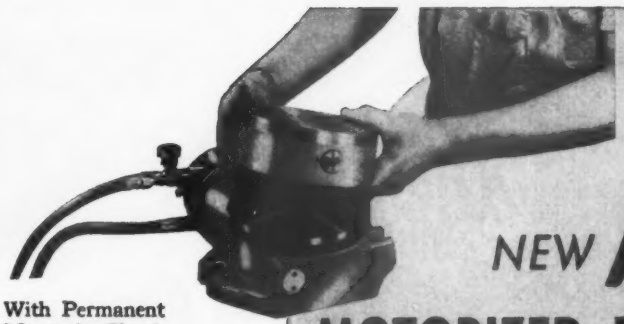
1.2 This standard does not define the degrees of surface roughness and waviness or type of lay suitable for specific purposes, nor does it specify the means by which any degree of such irregularities may be obtained or produced. However, criteria for selection of surface qualities and information on instrument techniques and methods of producing, controlling and inspecting surfaces are included in Appendixes A, B, C, and D, which are not an integral part of this standard.

Optional roughness ratings have been eliminated in the revised standard which establishes a single parameter—the microinch arithmetical average deviation from the mean line. This parameter was selected after extensive investigation and debate by all interested parties. An overwhelming majority of sectional committee members expressed a strong preference for establishment of the arithmetical average rating and the elimination of the root-mean-square average rating. The decision reflected a consensus that arithmetical average is more readily understood and adaptable to a wider range of instrumentation.

As explained in the standard, there is an 11% theoretical difference between arithmetical average and root mean square average. This difference is in such a direction that continued use of drawings which originally specified rms measurements and the inspection of surfaces to those values with instruments calibrated to arithmetical average as called for in the standard would theoretically allow the acceptance of surfaces up to 11% greater roughness than originally intended. This difference, however, is of lesser magnitude than the usual variations in readings from point to point on a machined surface and is considerably less than the variation expected from one piece to another. For these reasons and because the absolute limit of roughness for satisfactory functioning is usually even more indefinite, many manufacturers consider it practical to adopt arithmetical average ratings without changing the roughness values on previous part drawings.

I might mention that the British have also standardized on arithmetical average which they refer to as center line average of CLA. The proposed revision makes

. . . Continued on page 28



With Permanent Magnetic Chuck

NEW *Vulcan* MOTORIZED ROTARY TABLE

for lapping and grinding

(not an index table)

With Lapping Plate

FASTER
circular precision grinding!

Now with this table and with less effort you assure highest standards of accuracy, flatness, finish and close tolerances. At the same time you eliminate slow and complicated tool setups. You cut grinding time greatly by using only cross feed while the table is rotating at infinite speeds between 40 and 100 RPM.

For example, Vulcan's Rotary Table can be used in connection with a sine plate or angle fixture. The dressing of large expensive external wheels for side grinding is therefore eliminated. If you wish we can provide permanent magnetic chucks designed for use with our table, both 6″ and 10″ in diameter.

Vulcan's Rotary Table is an air operated, self contained unit, portable between bench or machine. A precision center hole for locating and tapped holes in the table for clamping provides easy setup. Circular surface grinder applications are many and varied — grind flanged studs or bushings — bearing spacers — forming rolls — cutters — convex or concave surfaces — punches or dies (radius or angle).

Lapping? Yes — and in micro inches. For the 6″ and 10″ table, lapping plates of 12″ and 16″ are provided. Perfect for lapping valve plates, gages, bearing spacers and for carbide lapping using diamond powder. *Write for circular.*

Work clamped to motorized table, mounted on sine plate. Surface grinder application.

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Engineering, Processing, Designing and Building . . . Special Tools . . . Dies . . . Special Machines . . . Vulcamatic Transfer Machines . . . Automation . . . including the Vulcan Hydraulics that Form, Pierce, Assemble and size. Vulcanaire Jig Grinders . . . Motorized Rotary Tables . . . Plastic Tooling.

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CIRCLE INFORM-A-GRAM KEY NO. 25

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One of the main reasons for Danly's faster die set service is the *interchangeability* of die set parts achieved by Danly. It starts at the main Danly Plant where die set components are produced to Danly's traditional high quality, precision standards. The faster service cycle continues at all of the Danly Branch Plants where thousands of *interchangeable* die set components are stocked. The cycle is completed at the Danly Branch in your area where these parts are assembled as a die set to meet your specific requirements and shipped as soon as your order is received. So remember—for the best in die sets in the shortest time, the place to call is your local Danly Branch.

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...to finished die sets

NEW KENDEX* TOOLING

costs less on all 3 counts

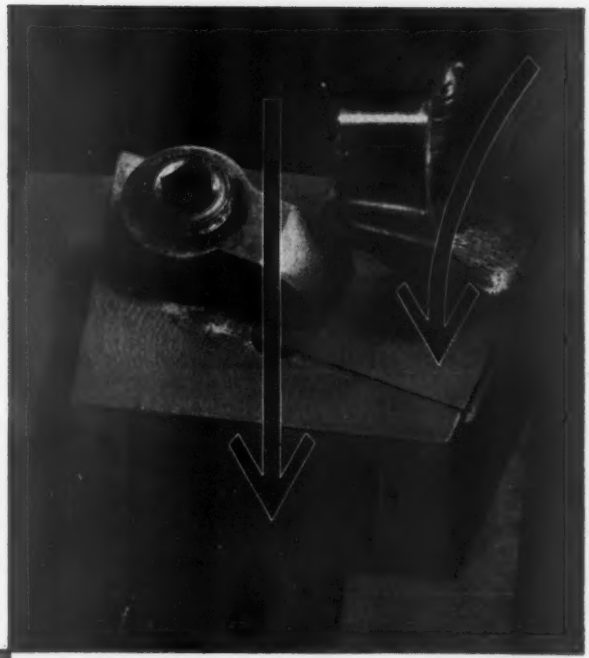
. . . initial cost, tool cost per piece and parts replacement cost

Each component of the *new* Kendex Tooling has been designed with but one thought in mind . . . lowest possible cost per cutting edge.

The holders are of simple but sturdy construction, and have the capacity to take deep cuts in a wide variety of operations. The clamp lifts for quick, accurate indexing, and is so designed that clamp forces are in the same direction as cutting forces—not opposed to them—to avoid counter stresses. Hardened, replaceable shims, on all but the smallest size, protect shanks in case of accidents with the tools. There is no complicated seat adjustment mechanism to weaken the Kendex shank. Kendex "turnover" inserts fit perfectly into place in accurately ground seats, and are supported by solid, heat-treated shanks. Center height of the cutting point is constantly maintained.

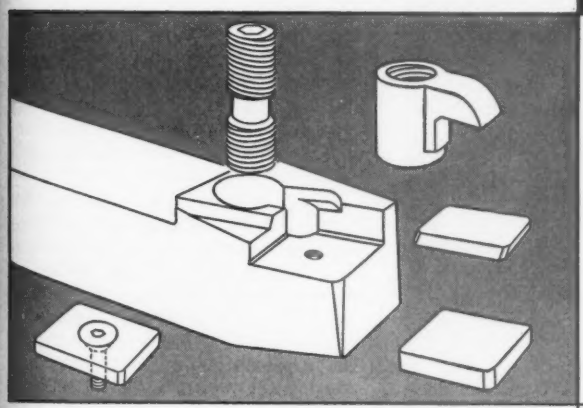
The new Kendex is available in a range of sizes in nine styles and two models: (1) Standard Tool used with or without replaceable chipbreakers, for a wide variety of average operations; (2) Heavy Duty model, with low cost, replaceable chip deflector, for cutting heavy and irregularly shaped forgings or castings where depth of cut may vary as much as one inch from side to side. *Both models use "throwaway" inserts . . . eliminate grinding.*

To learn how you can cut machining costs on all three counts, call your Kennametal representative, or write to KENNAMETAL INC., Latrobe, Pa.



The effectiveness of the rugged Kendex holder can be measured by its capacity to take a variety of cuts, from extra light to very deep, using the same tool.

Clamp forces are in same direction as cutting forces—and not opposed to them. This is indicated by the arrows in the above photograph. Counter stresses are thus eliminated, adding to tool life.



←The new Kendex is simple in design with a minimum of parts . . . no complex mechanism to adjust or fail. "Throwaway" type inserts index quickly and accurately in the rugged, heat-treated shank, with cutting edge perfectly aligned. Clamp has sufficient travel to hold insert when carbide chip-breaker is not used. Shim (where used) screws to holder.

The table below gives a comparison of initial cost of Kendex holder and hardware with a comparative, competitive tool. Note the low cost of replacement parts for the Kendex KAR 16.

TOOL COST COMPARISON

(1" x 1" shank, without inserts)

Toolholder "A"		Kendex KAR 16	
Holder only	$25.00	Holder only	$ 8.00
Hardware:		Hardware:	
Chipbreaker plate	$3.50	Shim†	$0.90
Elevator	4.25	Clamp	1.25
Main screw	1.00	Clamp Screw	0.15
Chipbreaker plate screws	0.35		2.30
	9.10		
Total initial investment	$34.10	Total initial investment	$10.30

†Hardened, replaceable shim absorbs stresses of any possible overloading beyond tool capacity. Inserts last longer and machining costs are held to a minimum.

*Registered trademark

5510

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WEAR AND HEAT-RESISTANT PARTS
INDUSTRY AND KENNAMETAL ...Partners in Progress
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. . . Month's Talk, from page 24

mention of this and other differences of terminology in the British standard.

In discussion with British representatives it has been pointed out that center line average is not as definitive as the term arithmetical average because center line average could admit any kind of a center line average, even rms, which the British definitely intended to exclude.

One of the major causes of misinterpretation of instrument reading has been effectively eliminated by the introduction of roughness-width cutoff and establishment of standard cutoff values. Early in 1952, M. E. Reason of Taylor, Taylor & Hobson, Ltd, noted British instrument manufacturers, convinced U. S. technicians of the soundness of including a definition of this feature in the revision of the American Standard. To further American efforts toward placing this feature into practical use, Taylor, Taylor & Hobson generously donated to the U. S. a patent on circuitry which provides for variation of roughness-width cutoff in stylus-type instruments.

Roughness-width cutoff is defined in the standard as "The maximum width in inches of surface irregularities to be included in the measurement of roughness height." A variable roughness-width cutoff allows instruments to be selective in the spacing or roughness peaks which are significant in determining the average roughness height value.

The instrument specifications contained in the proposed standard tie down the features of instruments such as stylus point radius, skid radius, and wave length cutoff points, but still allow freedom of internal design. The primary purpose for standardization of instrument detail is to eliminate the variables which have in the past led to differences in the measurements made on a given surface by different makes of instruments. It is anticipated that improvements in instrument design will not be hampered by the proposed instrument specifications.

Development of the proposed revision necessitated many compromises of opinion. At times, controversies were the order of the day, but as the work progressed sectional committee and subcommittee members became

. . . Continued on page 32

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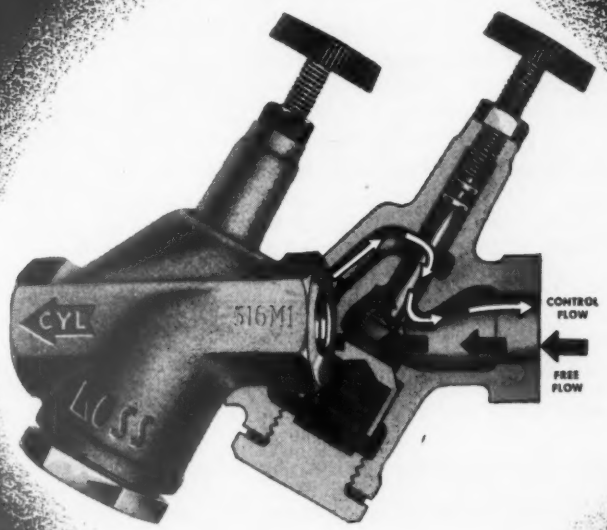

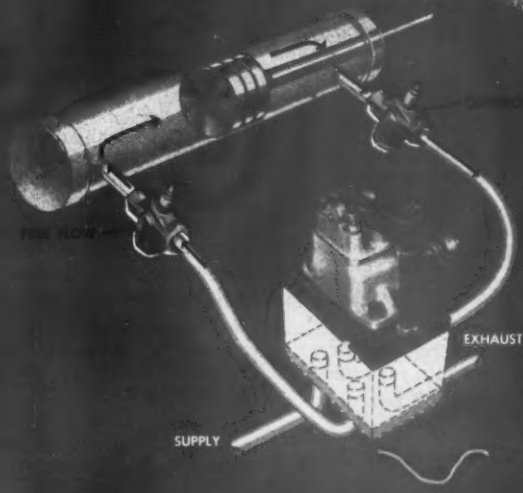

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Mar. 14-16. Society of Automotive Engineers. Golden Anniversary Production Meeting and Forum. Netherland Plaza Hotel, Cincinnati, Ohio.

•

Mar. 14-18. American Society of Tool Engineers. 1st Western Industrial Exposition. Shrine Auditorium and Exposition Hall, Los Angeles.

•

Mar. 16-18. Pressed Metal Institute. 6th Annual Spring Technical Meeting. Hotel Carter, Cleveland.

•

Mar. 28-29. American Institute of Electrical Engineers. Materials Handling Conference. Hotel Cleveland, Cleveland.

•

Mar. 28-Apr. 1. American Society for Metals. 9th Western Metal Exposition. Pan-Pacific Auditorium, Los Angeles.

•

Apr. 5-7. National Fluid Power Association. Annual Spring Meeting. Colorado Springs, Colo.

•

Apr. 6-10. World Plastics Fair and Trade Exposition, Inc. National Guard Armory, Los Angeles.

•

Apr. 12-13. Michigan State College. Centennial Symposium. Business in the Future. East Lansing, Mich.

•

Apr. 13-15. American Society of Lubrication Engineers. 10th Annual Meeting and Lubrication Exhibit. Hotel Sherman, Chicago.

•

Apr. 18-20. American Society of Mechanical Engineers. Spring Meeting. Baltimore, Md.

•

Apr. 18-21. Society of Automotive Engineers. Golden Anniversary Aeronautic Meeting, Production Forum, Aircraft Engineering Display. Hotels Statler and McAlpin, New York.

•

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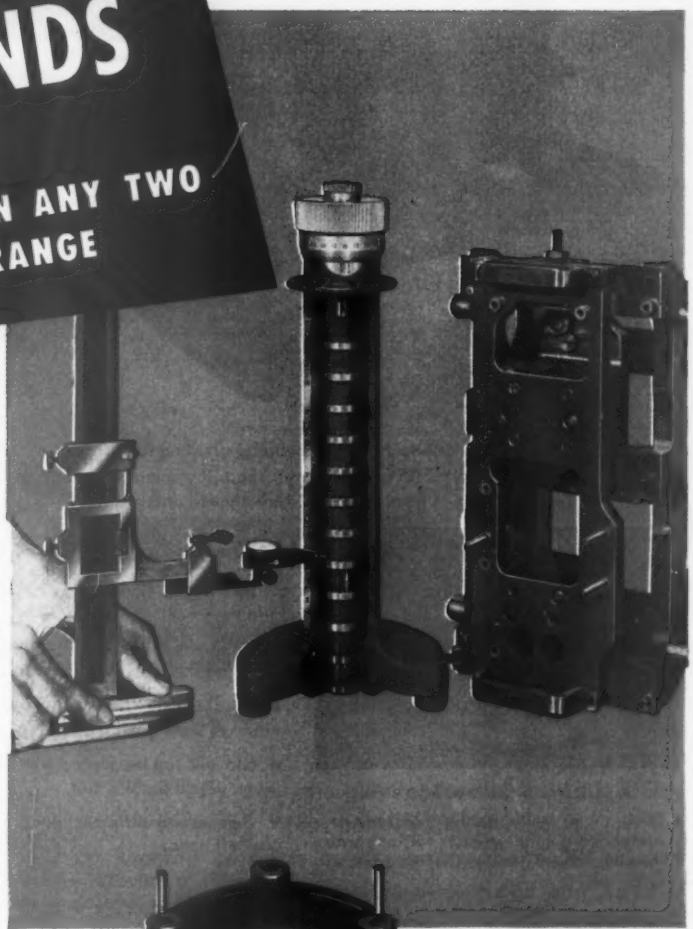
SETTING TIME:

10 SECONDS

ACCURACY:

.00005" BETWEEN ANY TWO POINTS IN 12" RANGE



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And, accuracy is assured! Between any 2 points in the 12" range accuracy is guaranteed within .00005".

With a reverse checking plate, a height-gage indicator is easily set for checking the underside of parts. Use of inside micrometers, telescoping and internal cylinder gages gives this gage added versatility. Send coupon TODAY for complete details!

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CIRCLE INFORM-A-GRAM KEY NO. 31

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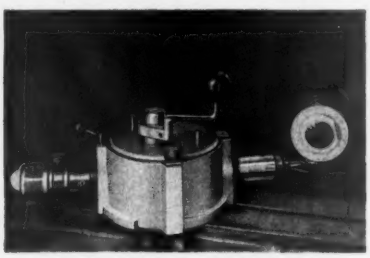
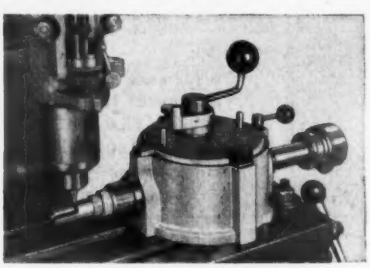
Can be removed and used separately as shown below.

This revolutionary new self-contained Multi-Spiral grinding fixture makes it easy to sharpen end mills COMPLETELY, in your own shop. It eliminates sending end mills out to be sharpened, saves time, saves money. Simple to operate.



Use It With Cutter-Grinders

Photo shows Multi-Spiral Head used separately on a cutter-grinder for long web thinning, flute grinding, step grinding tools, etc.



Use It With Milling Machines

The Multi-Spiral Head can also be used separately on milling machines for milling any spiral, right or left hand.

Use With Surface Grinder for fast, accurate TAP GRINDING

—Additional Features

- Do "Radial-Relief" by grinding inside the wheel.
- Finish-grind spiral lips and end in one operation.
- Left hand end mills ground as easily as right hand.
- End mill can be ground with slight taper, to mill parallel slot.
- One million different leads, right and left hand.
- Reversing motor for left hand end mills. Eliminates throwing burr on cutting edge.
- Hardened spindle and hardened bearing bushings.
- Spindle has 1" hole. Set of bushings for end mill shanks, and special spindle for 5C Harding Collets are available.
- Size: 31" long, 18" wide, 16" high. Weighs only 85 lbs.
- One socket wrench fits all bushings and spindle screws.
- (Safety) grinding wheel is held inside aluminum drum.

Send For Details Now!

SPIRAL STEP TOOL COMPANY

Designers and Manufacturers of All Types of Special Cutting Tools

5400 N. Damen Avenue • Chicago 25, Illinois
Phone: LOngbeach 1-5384

CIRCLE INFORM-A-GRAM KEY NO. 32

. . . Month's Talk, from page 28

more cooperative and more willing to give and take in the interest of achieving their common objective. In the final stages of the development, with certain minor details still unsettled, members agreed to waive all further objections with the understanding that after publication of the revised standard, details on which objections had been waived would be subjected to further study. In this connection it was recognized that increasing interest in and knowledge of the subject would undoubtedly justify frequent review of the standard to insure that it keeps pace with progress.

The standard does not tell which surface to use where. No broad rules can be laid down by which the engineer can predict the most suitable roughness for a given set of conditions, and the proposed revision states "Experimentation or experience with surfaces performing similar functions are therefore the only criteria on which selection and specification of given surface characteristics can be based."

Although the present proposal is strictly American in content and style, attention to overseas standards has not been lacking. It is the firm belief of all concerned that we in America are now ready with an up-to-the-minute proposal on the subject of surface finish which can serve as a basis for American-British-Canadian unification and possibly for ISO discussions.

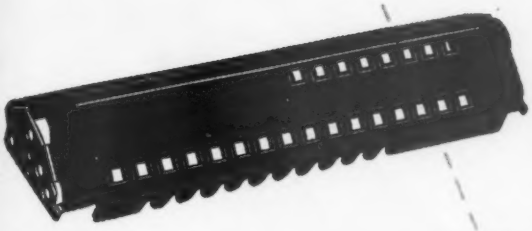
Conclusion

I would like to command Sectional Committee B46 which, under the successive chairmanships of E. J. Abbott, L. F. Polk, and Dean Jasper Gerardi, has carried the project of revising the standard to its present state of development and I would also commend the subcommittees whose chairmen were C. R. Lewis, C. E. Haven, and Joseph Manuele. Credit is also due the technical societies and the committees and trade associations which provided the critical background for developing the standards. J. A. Broadston and the NASC should also be cited for analyzing existing standards and convassing aircraft industry opinion.

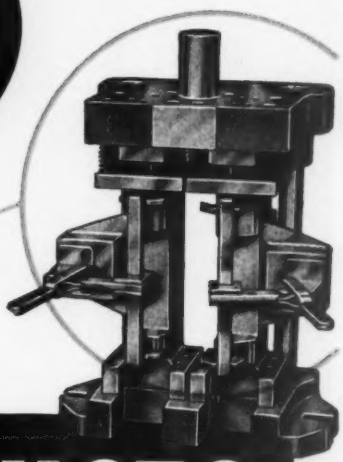
I express the hope that this has aroused your interest sufficiently to warrant your placing an order for copies of the revised standard.

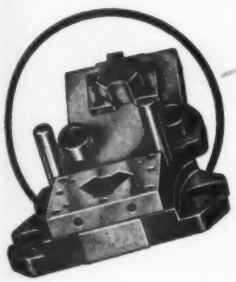
PRODUCTO *Catalog* DIE SETS

SOLVE SPECIAL STAMPING PROBLEM FOR MONROE



The Problem:
Stamping end-plate holes in the carriage cover of the Monroe Adding Calculator.

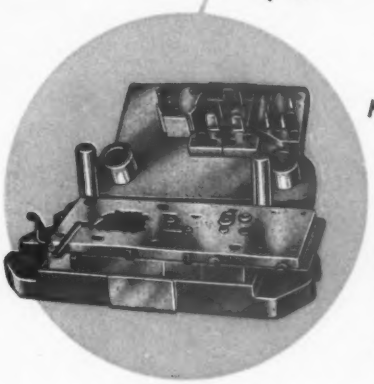




PRECISION

PRODUCTO

New design DIE SETS



THE DIE MANUFACTURER:
The Connecticut Tool and Engineering Co., Bridgeport, Conn.

The lofty die, at right, represents the last critical stamping operation in the production of the Monroe carriage cover, shown above. It's unusual because it pierces close-tolerance end holes in either 10" or 12" covers *after* they have been assembled. The die set that controls this precise piercing operation both looks and performs like a "special" made-to-order set. Actually, it is a rear pin catalog set fitted with 1¼" x 16" pins. Even with the long guide pins, the highly accurate parallelism is maintained. Yes, Monroe is getting the benefit of a "special" without paying for extras in time and expense.

In all, 12 Producto catalog die sets are used in stamping and forming this assembly. Only the one with the long guide pins is unusual in size or shape but *all* require the utmost in precision and dependability. The point to remember is this: Whether you require a "made-to-order" special or a "quick-to-order" catalog die set, you'll get the *best* from Producto.

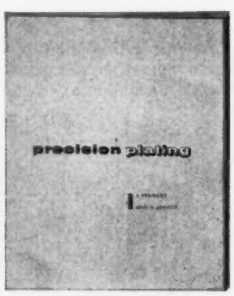
FOR PRECISION DIE SETS *FAST* CALL...

THE PRODUCTO MACHINE COMPANY • 970 Housatonic Ave., Bridgeport 1, Conn.

ALSO MAKERS OF DIE ACCESSORIES, FEEDING EQUIPMENT, VISES, MACHINERY. 2PD54A

CIRCLE INFORM-A-GRAM KEY NO. 33

PLATED UNBRAKOS AT WORK



UNBRAKO FORMULA FOR PLATED SCREW QUALITY. Make the screw precisely undersize with the finest machines. Plate it under rigidly controlled conditions in the best available plating equipment. Guarantee the finished product—Class 3A thread tolerance after plating. It is this unique formula that permits us to supply, with extremely good delivery, the plated UNBRAKO socket head cap screws for such precision applications as this high-speed centrifugal separator used in the processing of fish oils. The story of plating at SPS is told in "Precision Plating—a product and a service." See your authorized industrial distributor or write on your business letterhead for a copy of it. STANDARD PRESSED STEEL CO., Jenkintown 36, Pa.

UNBRAKO® SOCKET SCREW DIVISION SPS JENKINTOWN, PENNSYLVANIA

CIRCLE INFORM-A-GRAM KEY NO. 34

Wide range of models

NEW BRITAIN +GF+

COPY TURNING MACHINE

Changed over in minutes, using simple template, or prototype.

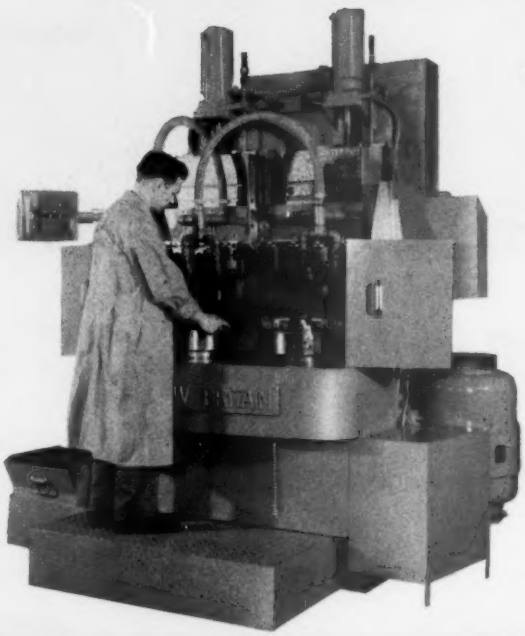
Created specifically for profitable copy turning and boring. Ask your New Britain representative for a showing of the color motion picture "A NEW APPROACH TO COPY TURNING" in your own plant. Or write The New Britain Machine Co., New Britain, Conn.

Economical for short or production runs.

See the following four pages for other New Britain *New's*.

New Approach to Precision Boring

It's cam actuated • It's vertical • It's New Britain

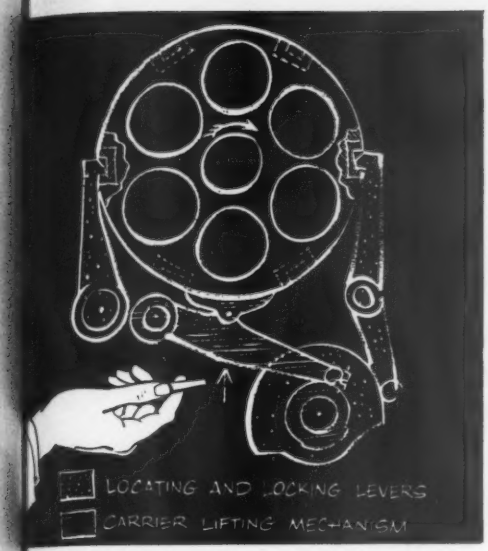


It extends the speed, accuracy and fine finish of precision straight and contour boring and turning to an even wider range of work.

New Britain's new vertical models feature accurate control of tool paths and cycle timing. This is the basic approach to precision boring employed in New Britain's famous single and double-end boring machines.

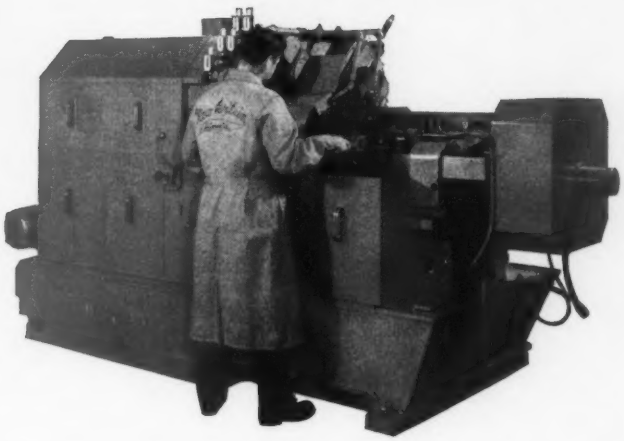
Shown below: a close-up of the tooling area of the Model 210 New Britain Vertical Precision Boring Machine at the top of the page.

Two pieces are machined simultaneously by duplicate sets of tools. Left hand piece has been removed to show construction of chuck.



Even slight wear on the spindle carrier or its locating pads would destroy accurate alignment of end-working tools with center line of the spindle. Blackboard sketch shows how carrier is lifted during index, positively located and locked during cutting cycle.

Billions of indexes with absolutely no wear!

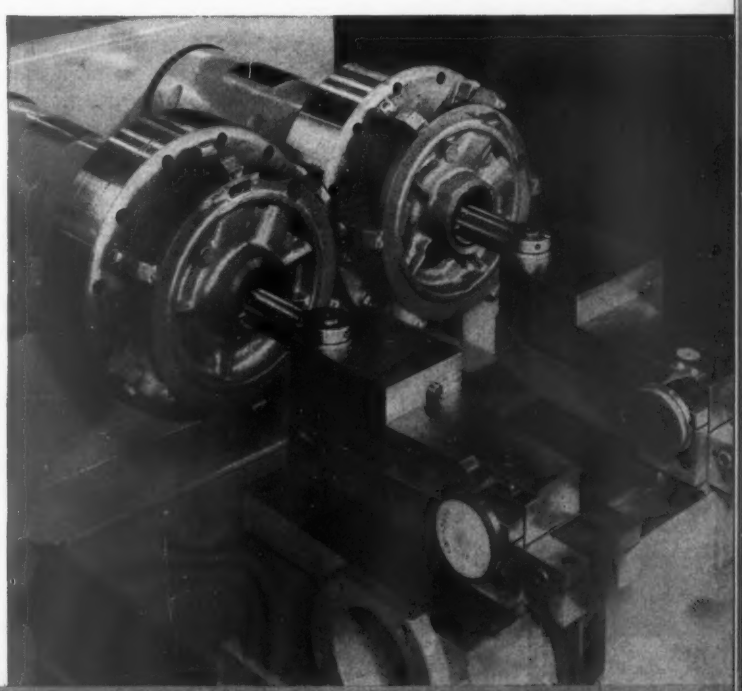


Experienced shop men say: *New Britain Chuckers stay on the job and stay accurate*. That sums up the profitable end results of exclusive features like the one described at the left.

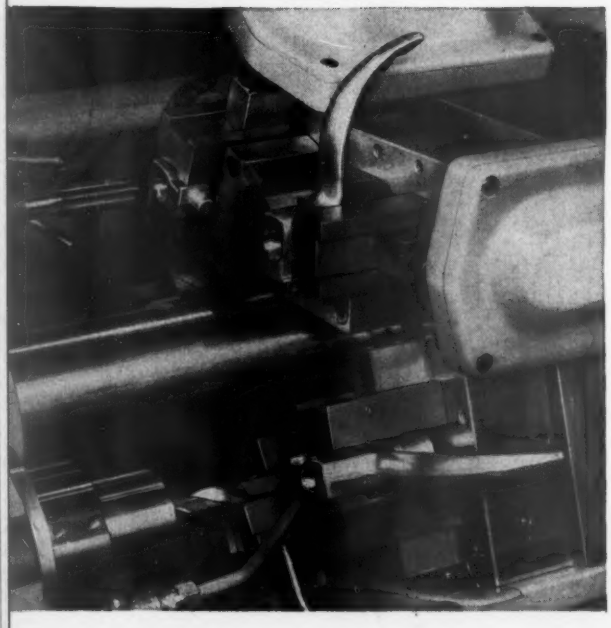
The secret of precision boring is constant close control of the tool

Successful precision boring and turning calls for control of tool paths and cycle timing, both with "gage makers' " accuracy. Precision ground cams insure this accuracy under all conditions on a New Britain. This hairline control, combined with ruggedness and stamina for *permanent* accuracy, produces fine finishes piece after piece, year in and year out.

See the preceding two pages and the two following for other New Britain *New's*.



New New Britain Chucker will produce pieces as fast as operator can load them



Irregularly shaped pieces — parts difficult to swing on a work-rotating chucker — pieces hard to produce at a profit, belong on the New Britain Model 23B.

This four-spindle chucker can machine up to 1290 pieces per hour (that's one every three seconds). A fifth, easily-operated, quick-acting chuck in the loading position minimizes idle time and operator fatigue.

If you produce pieces that lend themselves to a tool rotating machine, New Britain Model 23B could become one of the most valuable machines in your shop. Check with the New Britain man or write for Catalog on Model 23B.

LUCAS OF CLEVELAND

Model 6120S Lucas Precision Horizontal Boring Machine built for a large stamping plant, is used for reconditioning, altering and originating large die sections.

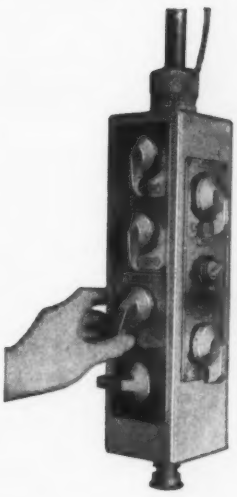
This short bed space-saving machine incorporates all the features of standard machines except a backrest for bar support. The 120" wide bed is of one piece construction for rigid table and saddle support.

This machine is ideally suited to heavy die work which combines operations of boring, drilling and milling in both high and low speeds.

This Lucas will be YEARS AHEAD for a long time

Because Lucas applies its engineering skill to boring machines exclusively — because so many of the important improvements have originated at Lucas — because every new development is incorporated in the next lot built, *you get the latest first when you buy a Lucas.*

For example: Lucas, one of the first to develop pendant controls on the Horizontal Boring Machine, now offers a new, compact, lightweight control pendant with smooth operating multi-purpose directional switch levers. Or take Lucas Automatic Power Positioning, with built-in, pre-set positioning feed which positively repeats a series of operations without the use of jigs and fixtures. Read more about these features and many other points of Lucas leadership — write for the complete story in detail. Lucas Machine Division, The New Britain Machine Company, 12302 Kirby Avenue, Cleveland 8, Ohio.



AUTOMATIC BAR and CHUCKING MACHINES • PRECISION BORING MACHINES • LUCAS HORIZONTAL BORING, DRILLING and MILLING MACHINES • NEW BRITAIN +GF+ COPYING LATHES

The NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division, New Britain, Connecticut
Lucas Machine Division, Cleveland 8, Ohio

See the preceding four pages for other New Britain New's.

The Finest Steel alone cannot insure Good Band Saw Blades

It also takes Expert Heat Treating

We use only the finest band saw steel available anywhere and test each lot metallurgically to be sure our high standards are met.

Yet, additional steps must be taken to insure superior performance in the finished product.

Expert heat treating, by saw specialists with years of experience in edge hardening, is one of them. This specialization and experience enables us to produce the uniform high hardness combined with toughness which is characteristic of MILFORD Band Saw Blades. We *KNOW* that MILFORD teeth will *BE* sharp and *STAY* sharp far longer.

These are FACTS, but a MILFORD Blade can tell its *own* story best. Ask the MILFORD distributor for a demonstration to prove this in your own plant.

Available in raker set, wavy set, profile, skip-tooth and the new MILFORD Hook Tooth for non-ferrous applications.

Write for your copy of the MILFORD Catalog.

BUY FROM YOUR **MILFORD** DISTRIBUTOR
. . . a local business man, to . . .
SAVE TIME . . . *through local availability.*
CUT BUYING COSTS . . . *with one source of supply.*
REDUCE INVENTORY . . . *he carries the stock.*

MILFORD

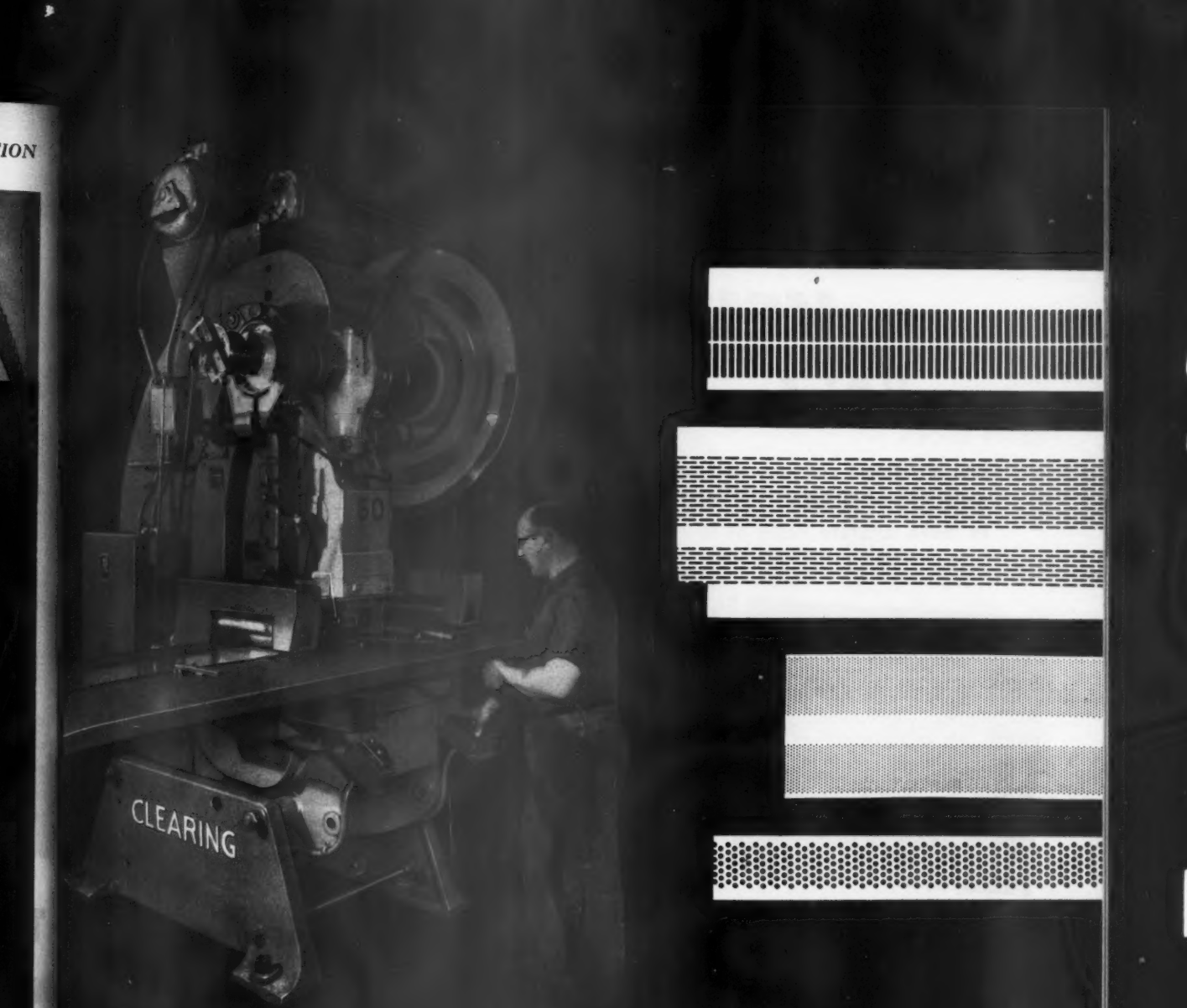
THE HENRY G. THOMPSON & SON COMPANY

Saw Blade Specialists for over 75 Years

NEW HAVEN 5, CONNECTICUT

Profile Blades and Band Saw Blades • Hand and Power Hack Saw Blades

CIRCLE INFORM-A-GRAM KEY NO. 40



high production–60 tons' worth

Write for your copy of Clearing's O.B.I. catalog. We'll send it promptly at no obligation.

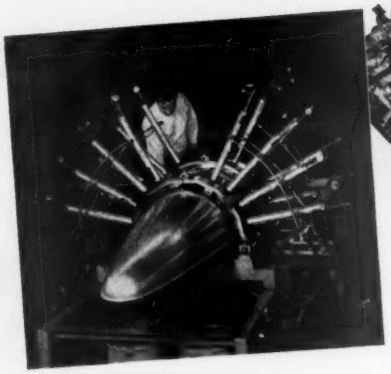
CLEARING PRESSES THE WAY TO EFFICIENT MASS PRODUCTION

DIVISION OF *U. S. INDUSTRIES, INC.* 6499 WEST 65TH STREET • CHICAGO 38, ILLINOIS • HAMILTON PLANT—HAMILTON, OHIO

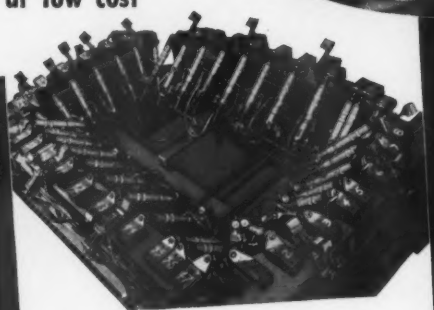
MULTIPLE DRILLING WITH KELLER "Airfeedrills"

Low investment and easy change-over make Airfeedrill setups the ideal way to make accurate holes at low cost

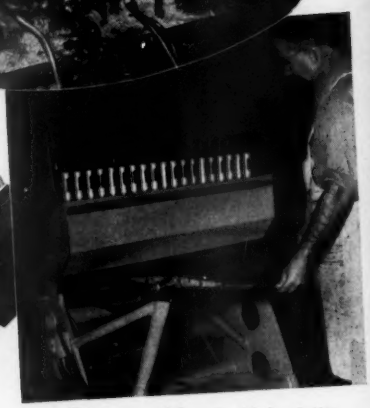
Eight Airfeedrills (four with dual spindles) drill 12 holes in 24ST aluminum part



Sixteen holes made simultaneously on teardrop gas tank. Note the drilling angles



47 Airfeedrills on a single fixture for making trim holes in automobile roof panels

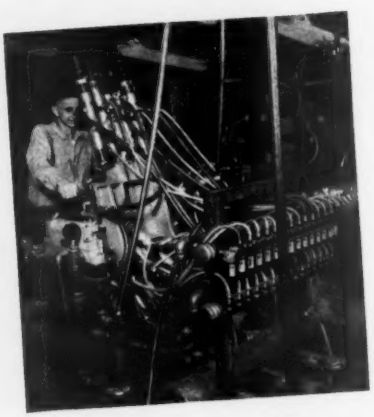


Fixture with 19 Airfeedrills used on guided missile fins at an aircraft plant

Here is the new way to handle multiple drilling jobs without investing in expensive machine tools. Simply build a fixture on which to mount Keller Airfeedrills . . . connect them with your air supply . . . and you are in business.

When the job has been run, the Airfeedrills are detached for use on another job. Where jobs are intermittent or short run, Airfeedrills permit high production where no other multiple drilling method would be economically feasible.

If you are not acquainted with the remarkable possibilities of Keller Airfeedrills, send for information without delay. Ask for Catalog Sections 92 and 92A.

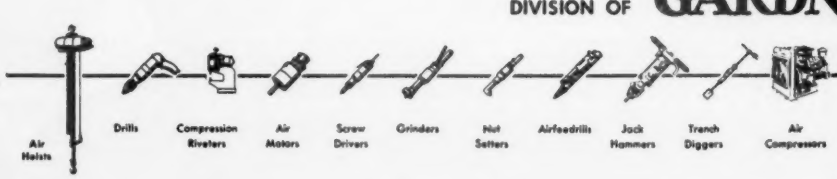


Fixture with 16 Airfeedrills used on section of automobile instrument panel

KELLER "Airfeedrills"

KELLER TOOL

DIVISION OF **GARDNER-DENVER**



1313 Fulton Street
Grand Haven, Michigan

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THE MOTCH & MERRYWEATHER CUTTING TOOL MANUFACTURING DIVISION

offers you . . .

cutting tool aids to production

ASK YOUR DEALER ABOUT EVERY ONE OF THEM

• Get the full story on Motch & Merryweather's complete line of saw blades and slitting-slotting saws — a type, size, and thickness for *every* purpose. Triple-Chip cut-off blades up to 108" diameter down to slitting saws 3" in diameter — special saws — for any machinable material, ferrous or non-ferrous, any size, any shape, any thickness. Ask how the M & M Triple-Chip Method reduces tooth strains, prolongs blade life and speeds production with accuracy.

KROSLOK® FACE MILLING CUTTERS and SHELL END MILLS

Simplicity itself!

Only 3 members — body, blade, wedge. Waffle design of body mates *rigidly* with waffle design in body. Cuts any machinable material. A profit-showing investment in *precision* production milling.

TRIPLE C® GRINDING COOLANT

Clear — Cool — Clean!

Triple C® grinding coolant makes for improved results and lower costs on all wet grinding. Transparent, stable solutions; maximum cooling; grinding wheels stay clean and free-cutting.

TRIPLE-CHIP HEAVY DUTY ANTI-WELD SOLUBLE OIL

M & M Heavy Duty Anti-Weld Soluble Oil lengthens tool life, especially under severe conditions. Deters "pick-up", cuts rejects, is oily (not greasy), odorless; lowers production costs.

THE MOTCH & MERRYWEATHER MACHINERY CO.

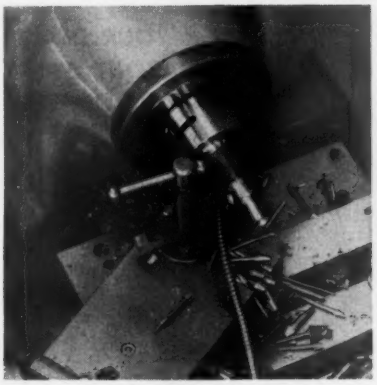
Cutting Tool Manufacturing Division

1250 EAST 222nd STREET, CLEVELAND 17, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 43

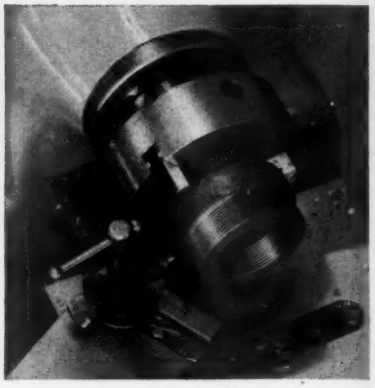
HARDINGE
ELMIRA, N.Y.

"The Outstanding Tool Room Lathe"



Precision Collet work for all sizes to 1-1/16" Collet seats *directly* in spindle.

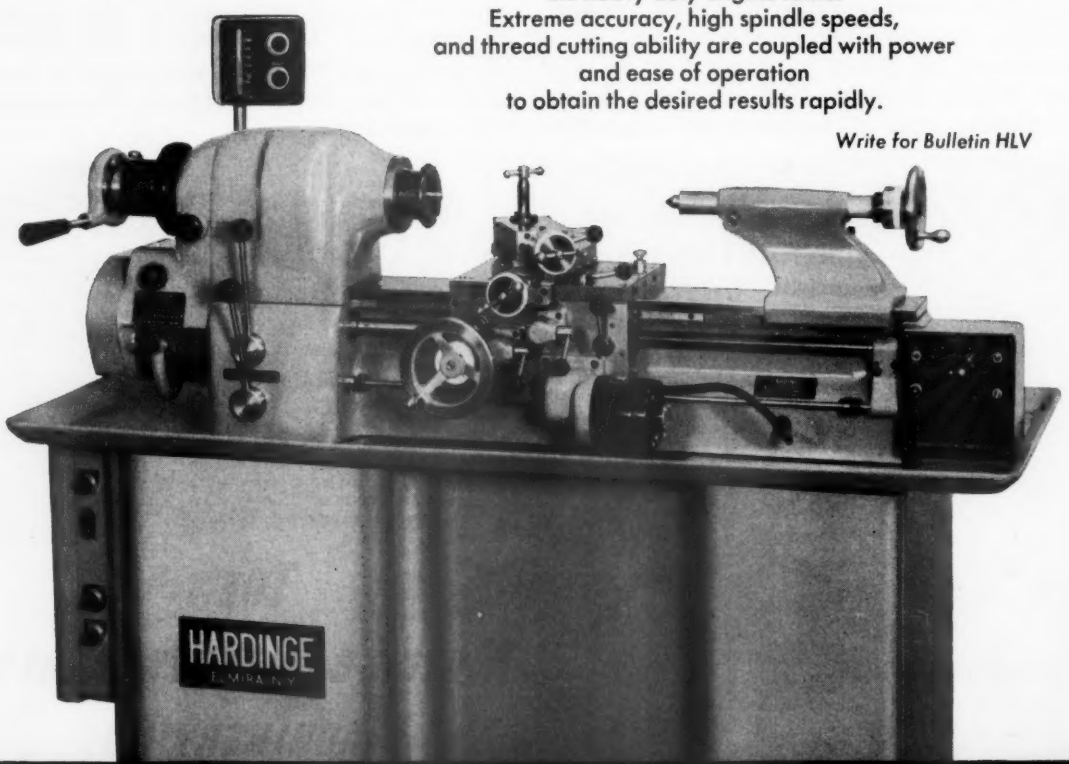
Precision Step Chucks for diameters up to 6". Provides Collet-like accuracy.



Integral Mount Jaw Chucks for precision holding of regular or irregular shapes up to 5".

Hardinge Model HLV 10" Lathe was primarily designed to fill a very old existent gap between the plain precision bench lathe and the heavy duty engine lathe.
Extreme accuracy, high spindle speeds, and thread cutting ability are coupled with power and ease of operation to obtain the desired results rapidly.

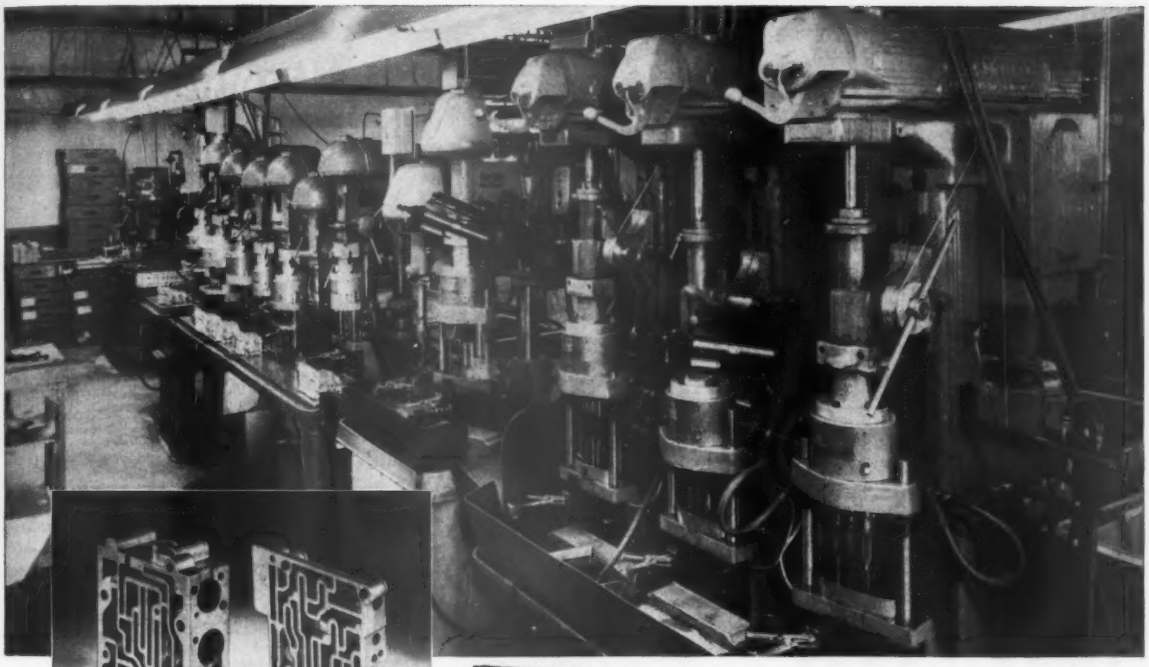
Write for Bulletin HLV

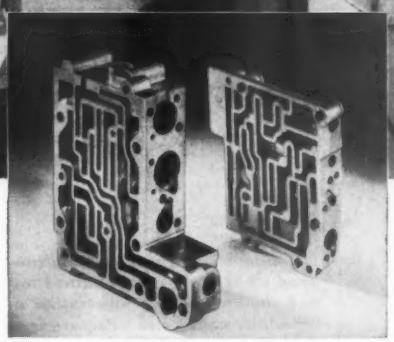


HARDINGE BROTHERS, INC., ELMIRA, N. Y.

OFFICES IN PRINCIPAL CITIES. Export Office: 269 Lafayette St., New York 12, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 44





Holes on extremely close centers vary in diameter from 1/16" to 13/16". The valve body has 33; the cover, 18.

"—BUT OUR PRODUCTION RUN IS LIMITED."

"SO WAS THE RUN ON THIS AUTOMATIC TRANSMISSION PART, BUT". . . .

HERE'S HOW ZAGAR TOOLING SAVED MONEY HAND OVER FIST

This aluminum die casting is processed in its entirety by Zagar planning, except for milling two faces. Two lines of Zagar standardized self-clamping drill jigs ream, tap and drill both valve body and cover. With 24 heads and 24 fixtures, Zagar performs work on 51 holes on close centers. Step tools take care of reaming and burnishing. The fixtures were designed to compensate for slight inaccuracies in the die casting. Thus has Zagar engineering solved an acute problem of limited production without the purchase of costly special machines.

Ask on your letterhead for Bulletin "T-3."

ZAGAR TOOL, INC.

24000 LAKELAND BOULEVARD • CLEVELAND 23, OHIO

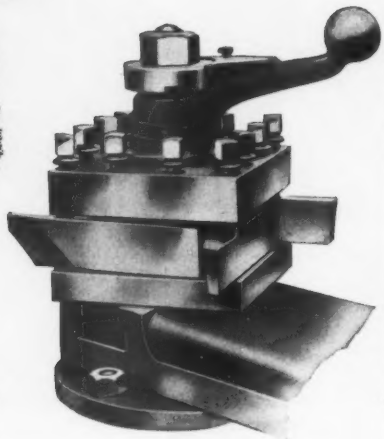
Zagar TOOLS FOR INDUSTRY and SPECIAL MACHINERY

CIRCLE INFORM-A-GRAM KEY NO. 45

McCROSKY

COST CUTTING TOOLS

5 STYLES
9 SIZES



Turret
TOOL POSTS

permit successive tools to be swung into position **quickly** indexed **accurately** and locked **rigidly**

Endorsed by All Well Known Lathe Manufacturers

Multiple tool jobs become continuous when you use McCrosky Turret Tool Posts. They permit engine lathes to handle — efficiently and economically — a wide variety of work that otherwise would require a turret lathe or specialized machine. Ruggedly built. 12 indexing positions. Mount in the T-slot of the compound rest or bolt circle of the main slide. Unsurpassed for performance and satisfaction. Write today for Bulletin No. 18-T. It gives full details.

COST CUTTING TOOLS **McCROSKY TOOL CORPORATION**
MEADVILLE, PA.

Engineering and Sales Representatives in the Principal Cities

ask us about...

Jack-Lock® MILLING CUTTERS
Face Mills, Shank and Shell End Mills, Half Side and Staggered Tooth Cutters. Sizes to 24" in dia.

Universal MILLING CUTTERS
Bodies can rotate in either direction. Simply using blades of proper hand, angle and cutting material, meets any requirement.

Block Type BORING BARS
Bore more pieces in shorter time, with greater accuracy. Stock sizes with straight or tapered shanks, with or without pilots, for holes up to 15" in dia.

Super®-Adjustable REAMERS
Chucking and shell designs. Proven construction locks blades rigidly, producing smooth, concentric holes.

Wizard® QUICK CHANGE CHUCKS
Tools are held centered and rigid. Operator can change tools without stopping or slowing down the spindle, increasing production and cutting costs.

Special PRODUCTION TOOLS
Combine 2 or more related operations into a single tool, producing better products, quicker, and cheaper.

Turret TOOL POSTS
Successive tools are swung into cutting position quickly, indexed accurately and locked rigidly, giving engine lathes the versatility of turret lathes. 5 styles, 9 sizes.

CIRCLE INFORM-A-GRAM KEY NO. 46

"Commendable Comments"

"Let the worker face what is to come with hope in his heart, not fear in his mind. Automation is a magical key to creation, not a blunt instrument of destruction, and the worker's talent and skill will continue to merit reward in the fairyland of the world to come."

—"Calling all jobs", National Association of Manufacturers' Booklet.

"Automation's pace will become swifter and swifter during the next twenty years and thinking will be in more advanced terms than we can even now visualize."

—Editorial, "Saturday Review" by John I. Snyder, Jr., President and Chairman of the Board of U. S. Industries, Inc.

"Atomic energy and automation—for good or for evil—are realities today—and their complete penetration of our economic and social structure is a matter of a measurable and relatively short time."

—Henry Bund, Research Institute of America, Editorial, "Saturday Review".

"The rate of consumer expenditures for durables will be relatively strong for the next two years because of such factors as population increase, a stabilized economy, a high rate of home building, and increased consumer purchasing power."

—From an address before the New York Society of Security Analysts, by Gwilym A. Price, President of Westinghouse Electric Corp.

"Automation . . . a magic key to creation . . . a better life for all of us . . . will supplant heavy, rigorous and unpleasant jobs with easier, more interesting jobs . . . is the key to greater productivity, higher living standards, more goods and services with less human effort . . . and like the atom, its potential is unlimited."

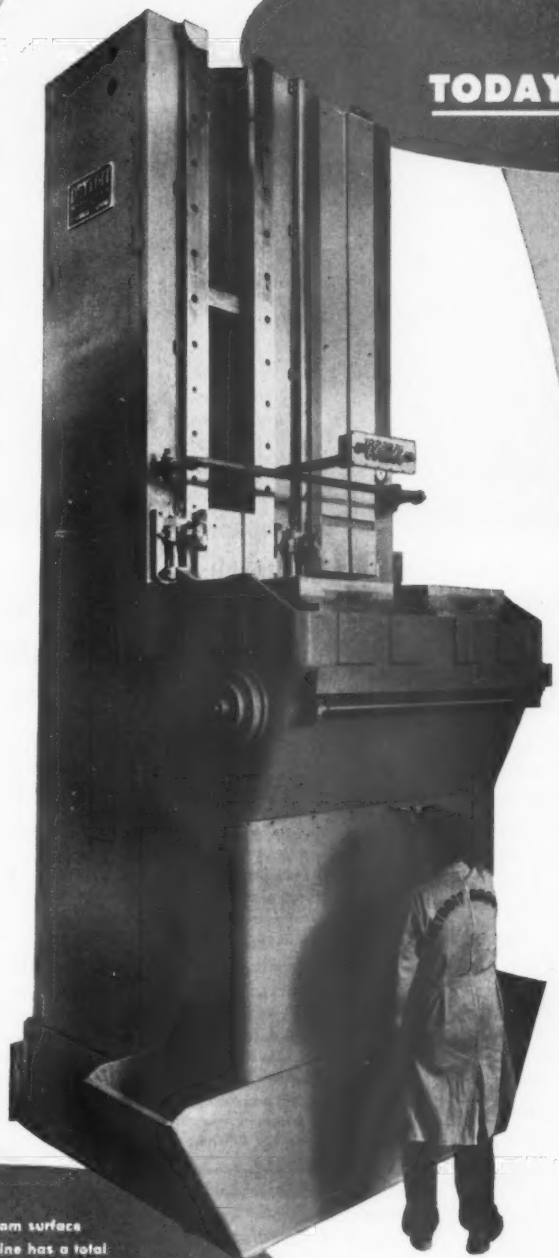
—R. H. Sullivan, Vice President, Ford Motor Company, speaking before the Cleveland Society of Professional Engineers.

"Two great benefits to mankind are foreseen from atomic energy. One, a great extension of the world's potential supplies of concentrated energy; two, the contribution to medicine, agriculture, and research in general."

—John Lear, "Saturday Review".

Detroit BROACHING MACHINES

BUILT FOR TODAY'S and Tomorrow's BROACHING NEEDS



This huge dual ram surface broaching machine has a total tolerance of .0005" run out throughout its 100" stroke. Machine was designed and built to lick a particularly tough broaching problem . . . furnished with complete carbide tooling.

Detroit Broach is building the finest in broaching machines . . . machines that are designed to make easy the broaching of today's "miracle metals." All of the experience and knowledge obtained from many years as a pioneer and leader in the design and manufacture of broaching tools has gone into the development of these "years ahead" machines.

Detroit broaching machines are sturdy and rugged in construction . . . designed to withstand high broaching speeds in the toughest of metals. The complete line is available in a wide range of sizes with strokes from 6" to 100". Many advanced engineering features are incorporated, such as Oilgear hydraulic equipment, automatically adjusted shuttle tables and precision slides.

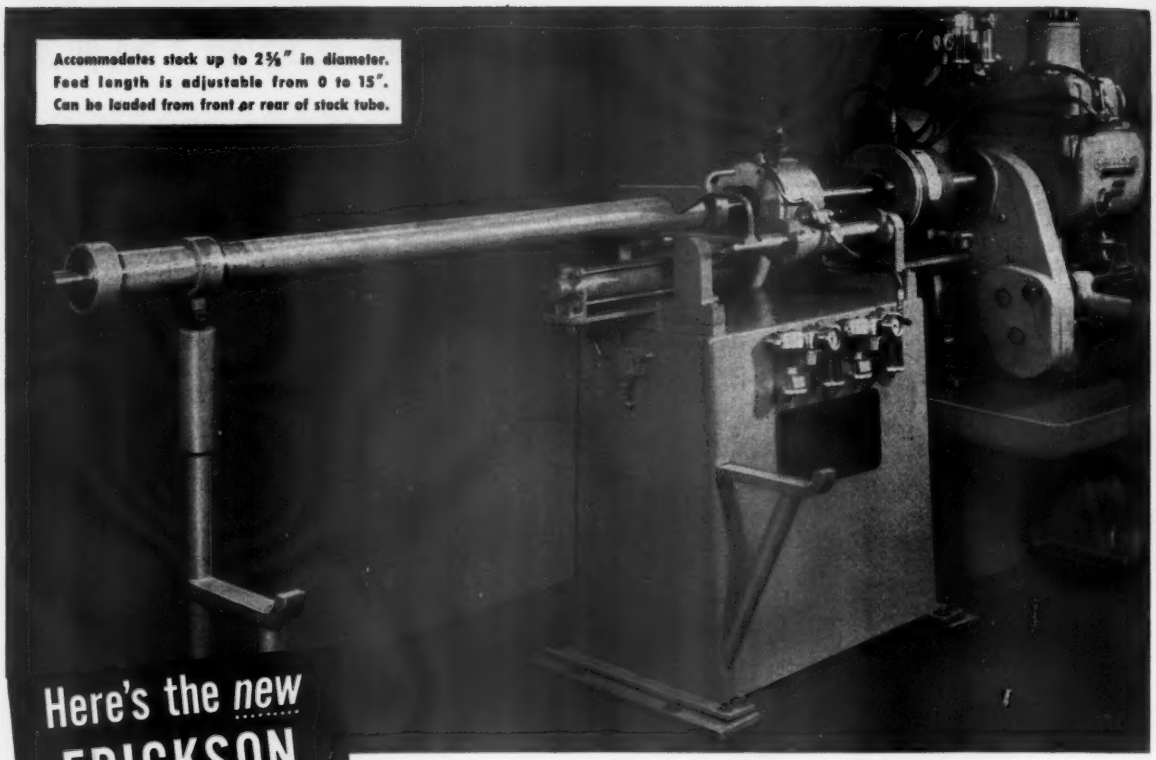
COMPLETE BROACH SERVICE

For many years specialists in broaches and broach tooling exclusively, Detroit has unmatched experience and facilities to offer for broach tooling also. Thus, you can place complete responsibility for your entire broach needs in the hands of *one* competent organization. The result is consistently greater production economy, efficiency and precision.

Detroit Broach COMPANY

ROCHESTER, MICHIGAN

OFFICES IN PRINCIPAL CITIES THROUGHOUT THE WORLD


Accommodates stock up to 2⅝" in diameter.
Feed length is adjustable from 0 to 15".
Can be loaded from front or rear of stock tube.

Here's the *new* ERICKSON PNEUMATIC BAR FEED!

...An Automatic Air Stock Feed and Collet Operating Unit Designed to Operate with any Collet Equipment

● *Increases production* ● *Reduces operator fatigue*

THIS NEW ERICKSON Stock Feed automatically feeds bar, hex or tubing stock to your machine tools for rotating or non-rotating machining operations. It is an air-powered, fully automatic unit which is quiet, simple to operate, safe to use, rugged and dependable. It can be used with any type of collet equipment.

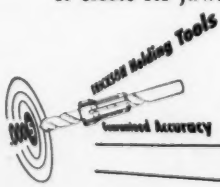
EASE OF OPERATION reduces operator fatigue and speeds set-up cycle time. One valve controls entire operation. At a flick of the valve handle, spindle collet opens and feed chuck advances stock to preset length; feed chuck then opens its jaws. Another flick closes spindle collet on stock and returns feed chuck to its starting position where it closes its jaws on stock to give double grip.

AA-976

OPERATIONAL ADVANTAGES

- Assures positive movement of stock. No dragback of stock on return stroke.
- Adjustable feed chuck jaw pressure eliminates marring or crushing of stock while providing positive grip.
- Permits use of exact size, polished stock.
- Provides double grip on stock to resist "pushback".
- Stock feed is adjustable to suit cycle time and bar size.
- Stock moves with spindle rotating to reduce cycle time.
- No safety controls needed due to basic design.
- Filler tube is supported over its length by ball bearings in stock tube. It rotates with stock to prevent marring, eliminate chatter.
- Rugged welded base construction rigidly supports feed chuck, dampens vibration, reduces whip, guaranteeing smoother finishes, quiet operation.

For complete information on the new Erickson Pneumatic Bar Feed, send for your copy of Circular K-2 today!



ERICKSON TOOL COMPANY

2301-3 Hamilton Avenue • Cleveland 14, Ohio

COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • SPECIAL HOLDING FIXTURES

CIRCLE INFORM-A-GRAM KEY NO. 48

Q-C rides herd on cost-cutting

It all starts when the board of directors regains consciousness after a preview of the latest profit and loss statement. The word is passed all the way down the line: "We've got to cut our costs — or else." By the time this dictate has gone through channels from the executive vice-president to the floor sweepers the implication has become: or else there will be no floors to sweep!

This is just fine and dandy, for as our reader-members of the Manufacturing Management team well know, the sure way to reduce production costs is to modernize, to install the latest in machines and tools — new machines and tools of performance and quality capabilities which will guarantee not only lower production costs by virtue of higher productivity but will insure that higher quality which today's buyers of end products are insisting on along with lower prices.

So, as we said, fine and dandy! BUT, along with their directive to reduce costs, the board of directors overlooked that little item of a carte blanche to toss out all the venerable equipment and give your buyers of machines and tools a field day. Thus the battle is joined. Manufacturing Management has to fight for appropriation for new machines, for new tooling, and for the wherewithal to modernize where modernization is feasible.

In its efforts to attain the lower unit costs which come with increased productivity of men, machines and methods, Manufacturing Management has a faithful ally in Quality Control techniques. Those who are charged with the responsibilities of Quality Control are working partners on the Manufacturing Management team — a full partnership even though, at times, Quality Control has to perform a policing action.

Quality Control, with due respect to the board of directors' directive on cost cutting knows that false economy is expensive — expensive in costs, in productivity, and in deterioration of customer relations.

Quality Control knows, and has the inspection equipment and measuring tools to prove, that there is a limit beyond which you can not gin up an old machine to perform "like new" — either as to productivity, or ability to hold dimensions repetitively.

Quality Control knows, and has the inspection equipment and measuring tools to prove, that you can not substitute cheaper materials without their becoming evident in the performance and life of the end product — after the end product gets in the hands of the user. This makes for fewer customers.

Quality Control knows, and has the inspection equipment and measuring tools to prove, that if you shop for cheap and cheaper prices from vendor-suppliers, you are at the same time shopping for trouble.

Cost cutting is commendable and essential, and is the principal mainstay of higher quality products at lower selling prices to bigger and bigger markets. Henry Ford proved this for all time and for all unbelievers when he switched from the Model N to the Model T. It took a brand new plant (Highland Park) loaded with new machine tools, new tooling, new methods, and new materials, to do it. Did it pay off? You might ask your board of directors!

This next May will see *TOOLING & PRODUCTION's* 8th Annual QUALITY CONTROL Feature Issue. Over these years we have been in the vanguard of the introduction of QUALITY CONTROL to Industry. Our role has been that of conveying to you the latest in QUALITY CONTROL know-how and show-how from QUALITY CONTROL authorities who live with it and work with it every day.

Our authors are those in manufacturing management who have had the responsibility for making QUALITY CONTROL work in their respective plants. In them we have found men and managements big enough to permit our imparting their knowledge and experience to you — oftentimes their competitors.

In doing this we have set standards of editorial authenticity and practicality that are a continuing challenge to us to provide even more and better QUALITY CONTROL editorial features. In our May Q-C issue we will meet that challenge. You can look forward to it, and we will not let you down.

E. Willard Pennington

editor

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PROGRESS ON PARADE 146
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8 TONS OF POWER

For BENDING • CURLING • BOX FORMING • CORRUGATING
PUNCHING • BLANKING • HEMMING • FLATTENING

NEW DI-ACRO* PRESS BRAKE

Eliminate tie-up of a large press brake on short-run production jobs with the new Di-Acro Press Brake. It's quickly set up for experimental engineering too. Hand operated—ample power is provided for average use by a simple cam lever mechanism, plus a power multiplying ratchet drive for heavy forming jobs.

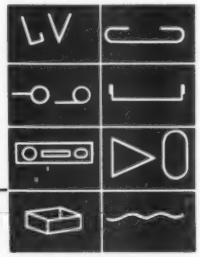
New Di-Acro Press Brake forms 16 gauge mild sheet steel across the full 24" forming width, 10 gauge mild sheet steel across a 12" width as well as inconel, brass, aluminum, stainless steel, chrome molybdenum and other ductile materials. Available with standard dies and specials — both are interchangeable with other press brakes.

Write for free Press Brake literature.

Send for 32 page catalog . . . contains complete information on Di-Acro hand and power operated Benders, Brakes, Notchers, Punch Presses, Rod Parters, Rollers, Shears, Spring Winders.

*Pronounced Die-ack-ro

di-acro PRECISION METALWORKING MACHINES



O'NEIL-IRWIN MFG. CO.
315 8th Ave., LAKE CITY, MINN.

See Di-Acro Exhibit Booth 718, Western Metals Congress Los Angeles, Mar. 28-Apr. 1

CIRCLE INFORM-A-GRAM KEY NO. 50

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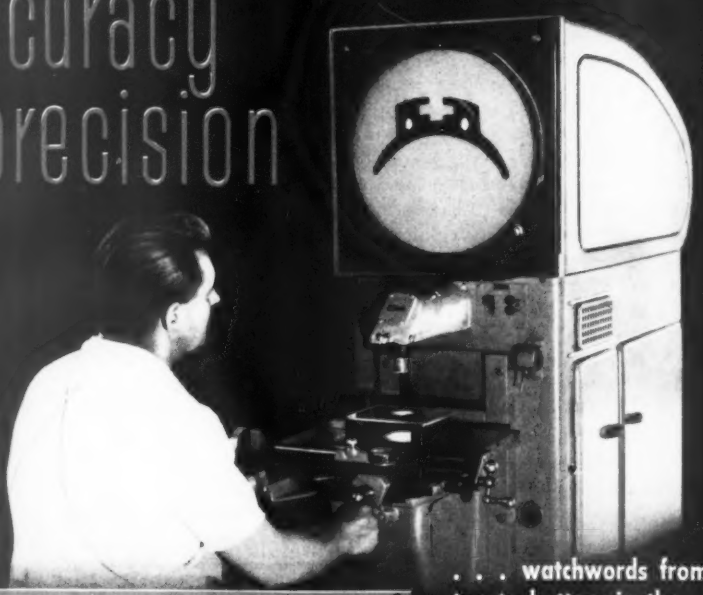
• accuracy
• precision



Comparing piece parts with tolerance drawings on Bausch & Lomb and Jones & Lamson comparators.

. . . watchwords from top to bottom in the HARIG organization

For over a quarter century, Harig has provided America's metal working industry with the finest precison tools man can devise. Highly skilled craftsmen combine their total of more than 1000 years of experience to guarantee you quality that pays off in your production line.

Carbide, lamination, molding and stamping dies, gages, fixtures, jigs, or special machining — whatever your need, you can depend on Harig to deliver a built in bonus of excellence.

Another Harig Carbide die designed to out perform a comparable steel die ten to one.

For further information on how Harig planning and designing can help solve your production problems, write for this completely illustrated catalog of plant facilities and services.

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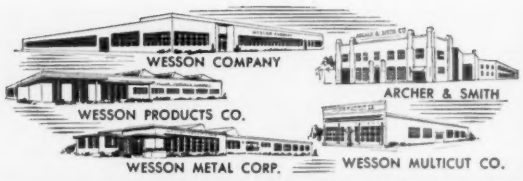


carbide NEWS

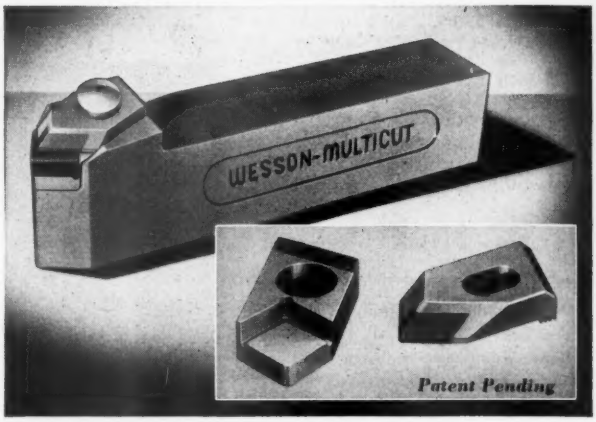
New "No Grind" Tools Cut Costs

Throwaway inserts and fully adjustable carbide faced chip-breakers among features of new Multicut line.

An entirely new series of Multicut tool holders for medium duty machining eliminates the need for all carbide grinding. Featuring a built-in carbide-tipped chip breaker with a wide range of adjustments, for different machining operations, the new Wesson Company holders do away with another area of maintenance costs—the grinding of chip breakers.

Large front and side clearance angles are made possible by the new holders, permitting ready application on jobs not possible previously with mechanically-held, carbide insert holders.

Another feature of the new Multicut is the one-piece anvil-locater plate, with built-in relief to clear built-up edges. Extreme strength and hardness overcome "feather edge" problems, especially on the end cutting edge angles.



New Multicut for medium duty machining. Inset shows anvil and adjustable chip breaker-clamp.

Chip breaker requirements of a wide range of machining operations are met by the adjustable breaker-clamp, available as either carbide-tipped for steel turning or steel-faced for cast iron. Serrations on the breaker-clamp matching those on the heel of the anvil-locater provide a wide range of settings beginning .050" back of the cutting edge.

Is Carbide Grinding on Way Out?

We doubt it, but the vast increase in life of carbide inserts achieved in Wessonmetal carbides has made it uneconomical to regrind tips or inserts, in many applications. It has become far cheaper, in many cases, to throw away the inserts when all cutting edges have been dulled.

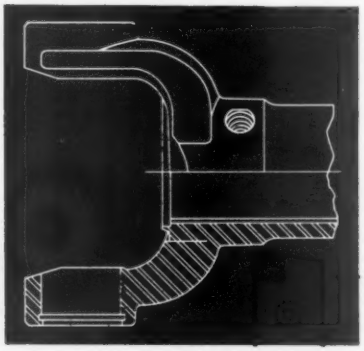
Facts on comparative costs on specific applications are available from Wesson Company direct or its staff of field engineers.

Shift to Wessonmetal Doubles Tool Life on Interrupted Cut

Production of automotive sleeve yokes on a job requiring a partially interrupted cut jumped from 137 to 300 pieces per grind at the plant of a midwestern manufacturer when a switch was made to Wessonmetal Grade WH and Wesson BDR band-type Multicuts from the steel cutting carbide formerly used.

The job is being done on a Lodge & Shipley 2-A Duomatic at 632 rpm and 372 sfm with a 3/32" depth of cut and .018" feed.

Workpiece is a fine-grain SAE 1140 steel forging. The area being cut on the sleeve is partially interrupted by the lubrication fitting hole. Wessonmetal Grade WH overcame the resulting excessive chipping of the carbides formerly used.



Wessonmetal doubles tool life on interrupted cut machining of fine grain SAE 1140 steel forging.

CARBIDE DATA

Additional information and specifications available:

Illustrated booklet describing the mechanical features and application advantages of the entire Multicut line for medium duty and finish machining.

Get data by writing to:
WESSON COMPANY, Dept. AD
1220 Woodward Heights Blvd.
Detroit 20, Michigan

tools Wesson carbide Wessonmetal

Fig. 1. PATH TO QUALITY. Batteries of modern automatic screw machines like these are manifestation of Standard Pressed Steel philosophy that the common-sense route to high product quality lies along the path of capital investment. Average age of machine tools in SPS' Jenkintown plant is under five years.

NEW

MACHINES, TOOLS AND GAGES

Assure High Product Quality

THE COMMON-SENSE ROUTE to top product quality lies along the path of capital investment, according to our experience at SPS.

We've invested heavily in modern production machines, in expensive tooling and in advanced gaging equipment . . . but only because we've demonstrated to our own conviction that this is the most economical way to increase quality and keep it high.

Just to prove that SPS is sold on bold but sound capital investment, take a look at the following figures:

- 80% of profits is consistently plowed back into new plant and machines.
- As a result of a recent $10,000,000 expansion, half of it in new production and toolroom equipment, the average age of SPS machines is about five years. Even so, 60% of them will probably be replaced by 1960.
- Over $1,000,000 has been invested in existing gages. What's more, a full one-eighth of the quality control budget is used each year to replenish and add to this remarkable stock of advanced gaging equipment.

An expensive bill to foot for increasing product quality, you say. Yes . . . but it's pure economy in the long run.

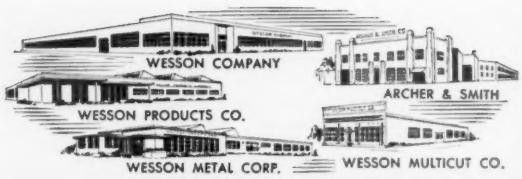
by John M. Sherman
Manager of Tooling and Quality

STANDARD PRESSED STEEL CO.
Jenkintown, Pennsylvania

In the manufacture of precision threaded fasteners, a business where accuracy and tolerances really count, **we've been able to cut customer complaints by 75%** — down to a low 0.9 quality complaints per 1000 shipments. In one department where quality was really out of hand, we cut defective parts reaching final inspection by 95%.

What's more, this capital investment approach to quality has had one other important effect — a dramatic increase in productivity. It makes sense that our people can produce many more physical pieces per day with new equipment when you consider that a 1954 machine tool can often out-produce a similar 1949

Capital Investment Is the Economical Way to Increase Quality



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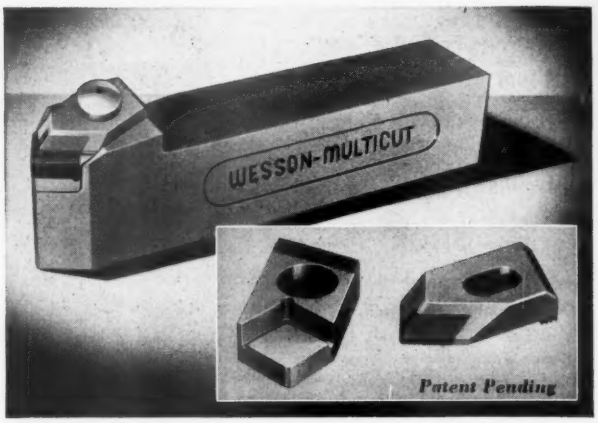

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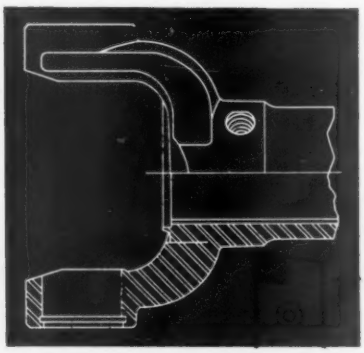

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COST OF CAPITAL VS. LABOR

	1900	1953
Annual cost of $100,000 investment (@ 6% in 1900; @ 3.6% in 1953)	$6000	$3600
One man's yearly wage	600	3600

Figures show that, while interest on $1,000,000 was equal to wages of 10 men in 1900, cost of similar investment in 1953 was equal to only one man's wage. While only approximate, these figures show that value of capital as a replacement for labor has increased tenfold in little over 50 years.

Figure 2.

machine by two or three times . . . and produce a better product, at that.

Sure we pay more for the new machine tool. But today capital costs are dropping while the price of labor is rising. In fact, the cost of capital in terms of wages is ten times less than it was 50 years ago. Just take a look at the chart in Figure 2 to prove that point.

So much, in passing, for the productivity aspects of capital investment. There's an entirely separate story there. We're concerned here only with its effects on product quality. And here's the story as it evolved at SPS.

Six years ago we launched a major program to increase quality standards for the complete line of SPS threaded fasteners — Unbrako socket head set and cap screws, Flexloc locknuts, and the wide variety of aircraft bolts and parts that we make.

The result was an entirely new approach to quality in which we —

- Switched emphasis from inspection of finished product to more thorough control of the materials, machines, tools and gages that were going into the product.
- Invested several million dollars in improved tooling and in a fully integrated SPS toolroom.
- Revised gaging techniques.
- Made our machine operators responsible for the quality of their work . . . and as a result:
- **Nearly eliminated in-process machine and bench inspection.**

Before taking these steps, we were unhappy with our quality performance. Though the large majority of fastener output was satisfactory by customer standards, the quality level was not what we thought our men and women were capable of maintaining with top-notch machines and tools.

To find out, we ran a pilot test in one of our major departments. Output of this department had been running well outside the tolerances we had set for our own production. We set our sights on an acceptable quality level (AQL) of 2%.

We first isolated a group of our newest, best automatic screw machines, put them into tip-top condition, improved our tooling, and then selected our best operators to run them. We carefully controlled the material going into these machines. And when we ran a series of control charts on the output of this machine group, found that the AQL goal of 2% was well within reach.

We then began making over other production centers in the image of our first pilot plant area — and with encouraging results. Today the reject level in the original test department is **below** 2%. Performance in other product lines has been comparable.

We immediately began to put increased emphasis on efficient machine tools in other departments. We girded ourselves to increase product quality by reconditioning our productive machines — rebuilding some, replacing others and, in many cases, completely retooling. And the new machines rapidly paid off.

Though we write most machines off our books in 14 years, we now attempt to replace

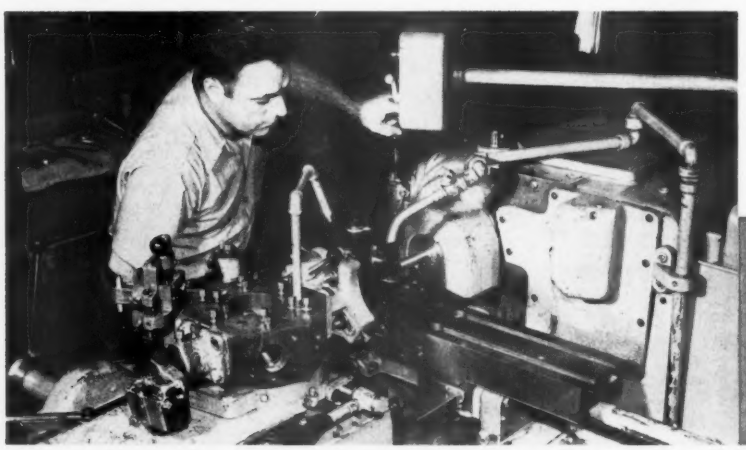


Fig. 3. MORE ACCURATE TURNING. New turret lathes with as much as double the horsepower of earlier models permit high velocity turning, improved accuracy, better surface finishes, and less distortion.

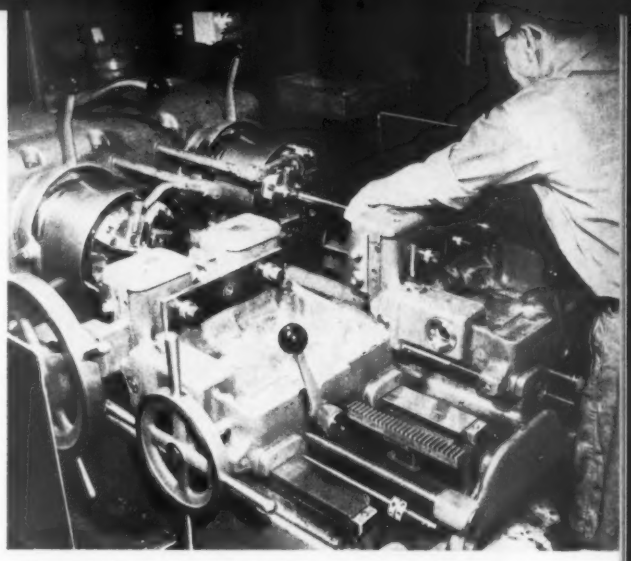


Fig. 4. EXACTING THREADING. New double-spindle threading machine has mechanically-controlled, positive feed to lead-screw which permits production threading of large bolts down to tolerances of 0.001".

most of them in less than eight years. As a result, **average production machine age is five years.** There are few older than eight.

We replace machines not on a scheduled basis, but whenever they stop producing at rated capacity or can no longer maintain required tolerances. It's grossly uneconomical to operate a machine at slower feeds and speeds, or only part time, in order to try to prolong its life.

New machines are run as new machines at SPS. They are tooled to capacity and operated for maximum production.

Back in 1949, one battery of 55 automatic screw machines was producing an average of 500 pcs/hr . . . with a reject rate at final inspection of approximately 30%. Today this department, with up-dated machine tools of the same type, is turning out an average of about 1200 pcs/hr. That's an increase in total pieces produced of 140%.

Reject rate in this department, however, has been cut to a remarkable low of one to two percent. So actually **the percentage increase in useful output is 237%** — or from about 350 to almost 1,180 good pieces an hour.

The reason? These new automatic screw machines, Figure 1, have the rigid supports, the accuracy in tool-slides and work-spindles to hold dimensions as close as 0.001" in high-speed production.

Thus we have our new machine tool equipment working for us two ways. First, we can run the new machines faster, take deeper cuts with them to increase total physical output. At the same time, the new equipment holds tolerances better, produces less rejects.

Everywhere in the plant, we can see the impact of new machine tools on quality . . . and also on productivity.

SPS uses a great number of turret lathes for the production of a variety of threaded parts. Our new turret lathes, like the one shown in Figure 3, have up to double the horsepower of earlier models and permit high-velocity turning with production increases of 25% or more. These machines have meant improved accuracy, better surface finishes, less distortion.

On older machines, we had had some trouble holding tolerances in the exacting threading of special parts and precision bolts. Now with new machines such as the double-spindle threader shown in Figure 4, thread tolerances can be held much closer, tool life is much longer. The new machines have mechanically controlled, positive feed to the lead-screw which permits production threading down to tolerances of 0.001".

In our press shop operations, too, newer, bigger machines are helping improve product uniformity as well as increase productivity.

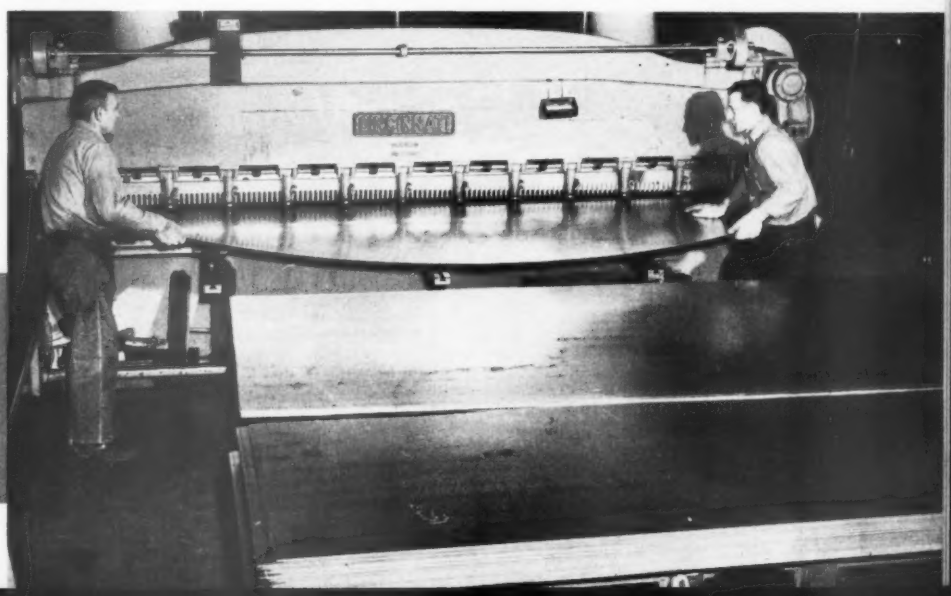


Fig. 5. SQUARE SHEARING. Modern shear easily maintains squareness of steel sheets even when handling stock up to ¼" thick and 12' wide.

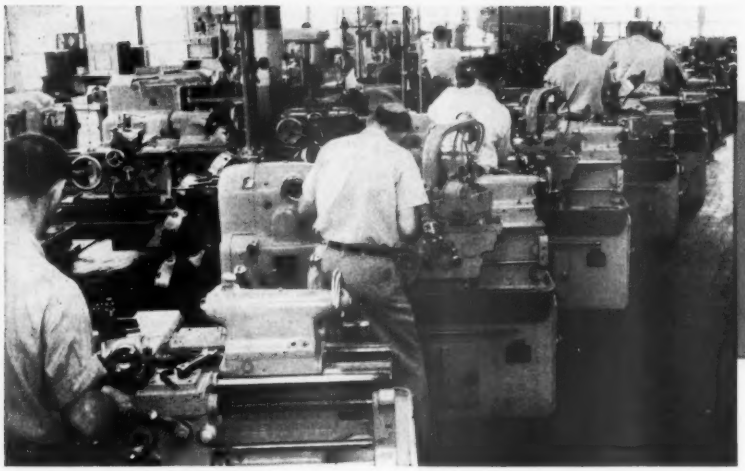


Fig. 6A. TOP TOOLING. New toolroom machines like these tracer lathes are evidence that investment in tool producing capacity is as important to top quality at Standard Pressed Steel as is investment in production machines themselves.

With large shears such as the one shown in Figure 5 we can easily maintain squareness of steel sheets. This unit will cut stock up to ¼" thick, and 12' wide. Since it's not necessary to change knife clearances for different sheet thicknesses and since knife edges require grinding only once a year, this investment makes production-sense as well as quality-sense.

Sometimes we invest for quality in machine tools that are completely different from their predecessors. Our batteries of modern cold forging machines turn out in one continuous series of operations fully-formed fasteners — parts that were formerly made in several stages on automatic screw machines. These giant cold headers can forge and extrude parts rapidly to about half the tolerance possible on production screw machines. Carefully machined dies in these headers produce a surface finish of 12 micro-inches or about one-tenth the roughness of a part turned out on an automatic screw machine.

We see then that proper tooling — as in the case of these header dies — can be important to product quality, too. And capital investment in tooling has been as important at SPS as has investment in the machines themselves.

To produce the precision dies for our headers, SPS has invested $500,000 in special toolroom equipment. Several times this amount has been invested in equipment needed to make just about every tool used in the SPS plant.

For this important job of tooling, we have set up a fully-integrated toolroom — almost a plant within a plant. The toolroom is completely self-contained in one area. It has every universal toolmaking machine in the book, complete heat treating facilities, a battery of grinders that includes surface, cylindrical, internal and thread grinding equipment.

Of vital importance in the manufacture of a completely interchangeable Class 3 fastener are precision thread rolls. The cold-forming thread rolls made and used at SPS are actually more accurate than the hobs used by most tool

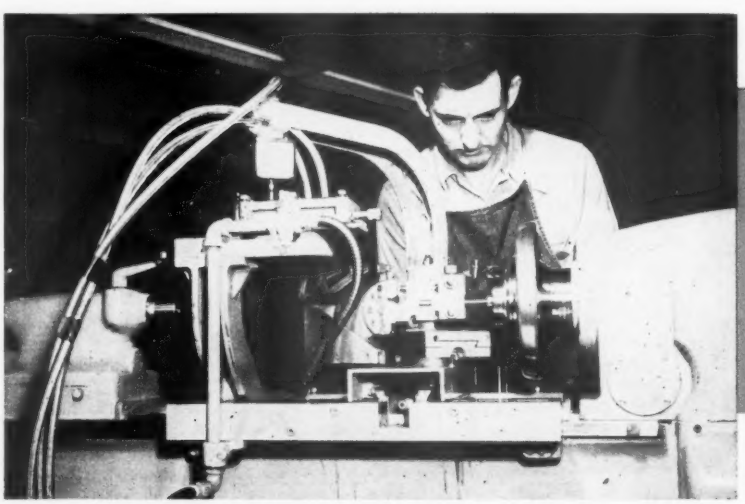


Fig. 6B. DELICATE DIE-WORK. Operator of a new tracer lathe can hold critical dimensions within 0.0005" while contour-turning, boring and facing this precision screw-forming die. This machine provides automatic sizing through combination air-tracer and hydraulically-operated power circuit working off a master template.

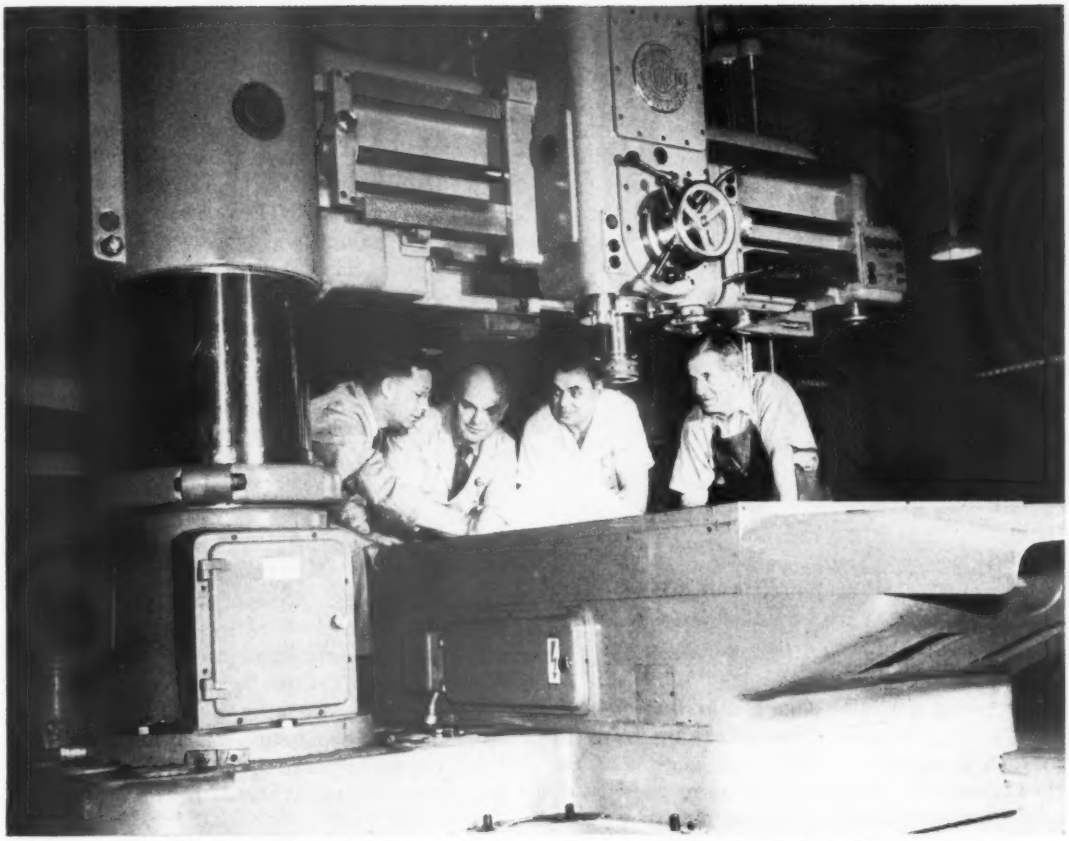


Fig. 7. HAIR-SPLITTING ACCURACY. Giant optical jig borer, recently purchased by SPS, can spot and drill holes on centers within 0.000125" — or within as little as 1/16th the diameter of a human hair. Products such as SPS' new line of shelving, stamped from dies on this jig borer, have unprecedented interchangeability of parts.

manufacturers. To get this precision and accuracy, we've teamed the best in grinding equipment with the skill of our experienced toolmakers. As a result we can turn out threads on a production basis that have a lead error of less than 0.0004" per inch.

New machines throughout our toolroom are helping to keep precision of tooling high on all product lines.

To turn multiple-diameter shafts and to turn or bore contours to high accuracy and smooth surface finish, we have bought new machines such as the air-tracer lathe shown in Figure 6. We have a battery of these versatile machines at work producing close tolerance, repetitive tool and die parts.

In the setup illustrated, a precision screw-forming die is being contour-turned, bored, and faced. Critical dimensions are held to within 0.0005". These machines can hold such tight tolerances thanks to their automatic sizing provided by the combination air-tracer and hydraulically-operated power circuit working off a master template.

These machines have cut rejects of critical tool and die parts from 20-30% to practically nothing. Average setup time is less than half an hour and **output per machine per man-hour has been increased** by approximately 25%.

Nowhere is the investment of capital in toolmaking equipment more evident at SPS than in its new optical-coordinate jig borer shown in Figure 7. This $45,000 precision giant, only one of its kind in this country, can spot and drill holes on centers with 0.000125" tolerance — or within as little as 1/16th the diameter of a human hair.

The versatile machine, encased in a glass housing to protect it from dust and draft, is being used by SPS wherever needed. Its main job to date has been to turn out highly accurate jigs, fixtures and dies for the production of sheet metal parts.

Dies for stamping the closely spaced bolt holes in the vertical supports of SPS' line of shelving were made on the optical jig borer. Thanks to jig borer accuracy, shelving parts stamped from dies made six months from now will be completely interchangeable with today's parts. As a result this shelving is probably the most precisely laid out and manufactured line ever produced.

The internal grinder shown in Figure 8, one of many at work at SPS, is a further illustration of the use of new machines to produce superior tools. We found that with existing equipment, only eight years old, we could not meet new, closer tolerances. The new grinders easily finish to size the bore of a knock-out sleeve within a tolerance of only 0.0002", have worked even closer. Greatly increased tolerances on dies brought with them a problem in gaging — a problem that we solved by improved air gaging techniques.

Thus you can appreciate that in addition to machines and tools, heavy expenditures on gaging have been an essential part of our quality-through-capital program. We have been buying the latest in gages and plenty of them to help our operators and final inspection staff maintain the close tolerances that we have set up as goals.

To back up the backbone of our quality system, the operators who build quality into our fasteners, we drew up a new gaging program, devised new techniques.

We set up a master gage center that checks our working masters. These working masters in turn are used in four local gage centers throughout the machining areas to check the actual inspection gages. All variable gages are checked at least once every eight hours . . . usually more often.

Inspection gages are supplied to all machine operators. They have been trained to use them, to interpret their readings. Gages and gaging equipment are set up right out on the production floor, on small stands which usually serve as local quality control centers for two adjacent machines.

We are continually buying new gaging equipment that can improve and speed up the job of checking product quality.

We had traditionally checked screw threads on a go-no-go basis. The operator would know that the product was good or bad, nothing more. Now using tri-roll gages modified to meet our special requirements, our machine operators measure lead, angle error and pitch diameter in terms of deviation from the standard. Knowing how much and in which direction the machines are going out, they intelligently make the needed corrections at once . . . often before tolerances have been exceeded.

This heavy emphasis on adequate gaging calls for plenty of gages. SPS has about a half million dollars' worth out on the production floor alone. We figure total investment in gages at over $1,000,000. Consistent with this investment is our yearly allotment of one-eighth of the quality control budget to purchase new types of gages, replace worn ones.

This concept of gaging, like the SPS philosophy of new production machines and tools, needs capital to make it work. But every sound investment of capital should bear a satisfactory return.

The return at SPS, in addition to increased productivity, has been in terms of true quality control — the production of a better product more economically, through the successful application of the best in materials, in men, and in methods.

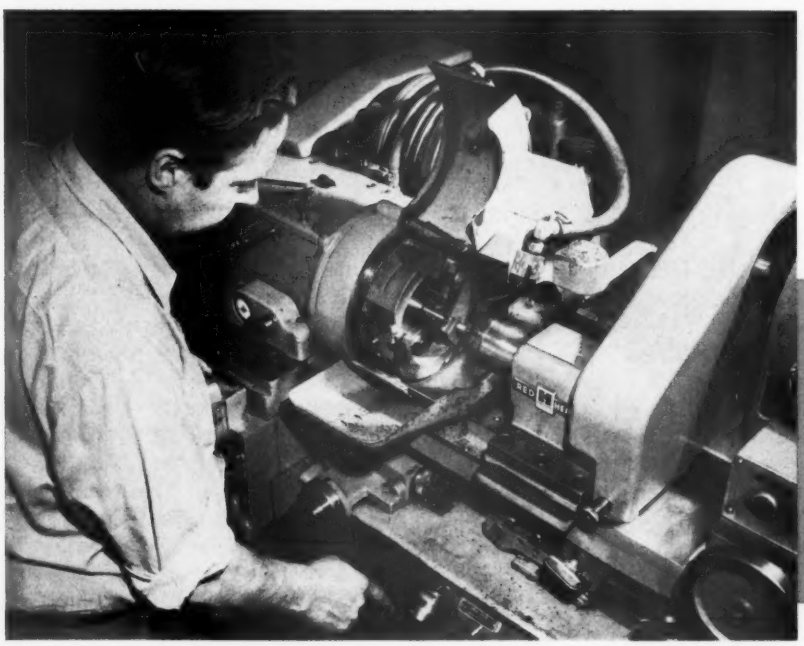


Fig. 8. ACCURATE GRINDING. Internal grinder, one of several in SPS toolroom, here finishes bore of knock-out sleeve to size within a tolerance of only 0.0002". SPS toolroom contains complete grinding facilities including surface, cylindrical, internal and thread grinding equipment.

Fig. 1. Box type clamping fixtures are used on the Heald Bore-Matic to hold the work-pieces while machining. Interchangeable locating plates are shown in the foreground.

MACHINING MAGNESIUM WITH CARBIDES

by L. W. Dwors

Assistant Works Manager, THE ROTOR TOOL COMPANY, Cleveland, Ohio

IN THE BUILDING of portable power driven tools, the manufacturer is constantly faced by the customer's demand for more and more power with less and less weight.

The Rotor Tool Company has endeavored to meet this situation by the use of magnesium for body parts in place of the customary aluminum; the magnesium having one third less weight than aluminum and equal strength.

Certain problems were faced in the machining of magnesium. This material is much more abrasive to tools than aluminum. Further, it presents a fire hazard due to the excessive heat generated as the tools become dull.

Most modern machine tools, though speeds have been increased, do not provide sufficient speed for efficient magnesium machining. This is probably due to the fact that magnesium is still not a widely used material except in the aircraft industry. We began experimenting with magnesium in 1936 and as the numerous fabricating and machining problems were solved, this material has gradually been incorporated into the tools. Today practically all our tool bodies are made of magnesium.

In spite of the slow speeds, we found that carbide tools were far superior to high speed steels because of easier maintenance of a keen edge over a longer period of time.

Fig. 2. A locating plug is used to position magnesium grinder housings in the fixture. It is shown being withdrawn after the housing has been clamped.

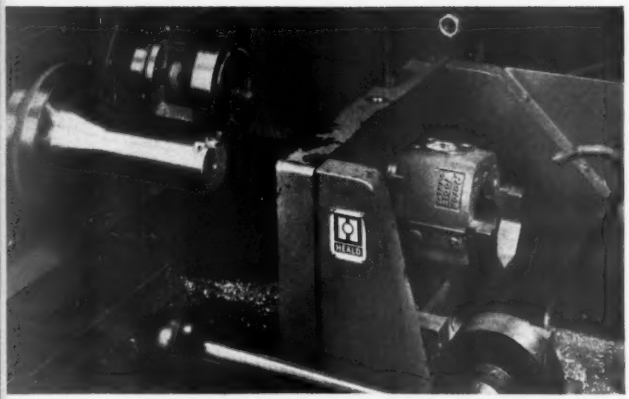


Fig. 3. Magnesium grinder housing is shown clamped in the fixture ready for boring by the carbide boring bar at left.

We continued our search for the proper machine for cutting magnesium and finally determined on a Heald Bore-Matic. This machine gives us the cutting speeds we desire with an additional advantage; the work is held stationary while the tool revolves. This feature eliminates the problem of fixture unbalance in the odd shaped parts that we are required to machine.

We are also faced with the problem of many diverse parts to be machined, which necessitated as universal a style of tooling as possible. This was provided by a box type clamping fixture shown in Figure 1, with the interchangeable locating plates shown in the foreground.

Figure 2 shows the locating plug being withdrawn from a magnesium housing for a small vertical pneumatic sander and grinder. In Figure 3 we see the housing in position with the carbide tipped boring bar at the left of the picture, and Figure 4 shows the complete piece and a cut-away section. The interrupted cuts on this piece present no problem, with limits

Fig. 4. Magnesium grinder housing at left after boring operation was completed. The cut-away sections at right illustrate the interrupted cuts that have been made without difficulty to limits of 0.0005".

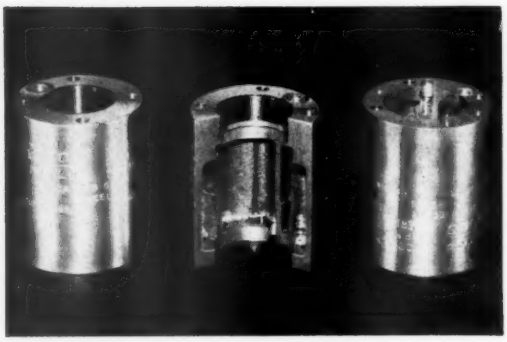


Fig. 5. The left view shows a cylinder housing with a steel insert visible in the upper end. The right view shows the magnesium end, while the center view shows a cut-away section. The two end bores are eccentric to each other. Interrupted cuts have been made in this part without difficulty.

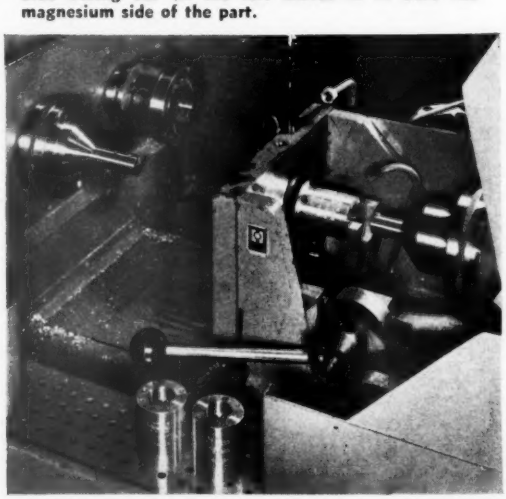
held to 0.0005", a cutting speed of 1040 sfm, and a mirror finish.

Another difficult problem handled by this machine was a cylinder housing with two eccentric bores. One of these bores is in magnesium, the other in a cast-in-place steel insert which is provided to give a more permanent ball bearing seat. Part is shown in Figure 5.

Figure 6 shows this piece in place in the machine ready for the carbide bar at right to machine the bearing bore. This is machined at 250 sfm to a tolerance of 0.00025". The fixture is then moved the required eccentric distance and the carbide bar at left machines the bore in the magnesium at 680 sfm to a tolerance of 0.0005".

A wide variety of work is handled on this machine. Carbide tools plus high cutting speeds give us the finishes and tolerances which are required to satisfy today's customers.

Fig. 6. The cylinder housing referred to in Figure 5 is shown mounted in the Bore-Matic ready for boring the steel insert. Upon completion the fixture is moved the required eccentric distance and the carbide boring bar on the left moves in to bore the magnesium side of the part.



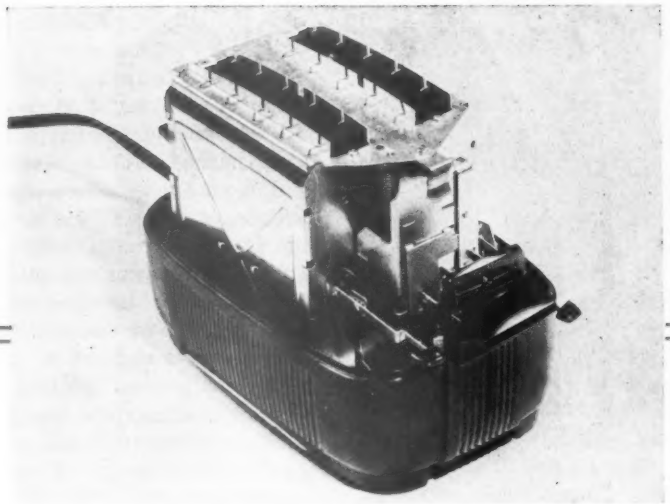


Fig. 1. The electric toaster is representative of many applications of aluminized steel in the domestic appliance field.

THE ALUMINUM COATED STEELS

by Lester F. Spencer, Metallurgist

ALTHOUGH THE USE of aluminum as a coating for steel is of comparatively recent origin, the increased usage of this material for both consumer and industrial products has established it as a material worthy of attention. Interest in aluminum coated steel is also evidenced by the large amount of information that has been published as to the variety of processes for attaining the coating. The various processes which have been employed either singly or in combination, include, (a) calorizing, which is a diffusion process; (b) plating, from a vapor phase of aluminum chloride; (c) metal spraying; (d) electroplating; (e) cladding, which is a rolling technique; (f) casting, as in the Al-Fin process; and (g) hot dipping. Of immediate interest are the properties, usages and working practices employed on the sheet and strip stock. The application of an aluminum coating to sheet and strip steel has been developed on a commercial scale by Armco; the process being similar to galvanizing. It has been reported[2], that the Armco process involves oxidation of steel and subsequent reduction of oxide film by utilizing a suitably controlled atmosphere furnace before the metal enters the aluminum bath.

The aluminum coating can be applied to either a low carbon steel, a copper bearing steel or a high strength steel; the choice being dictated primarily by the application intended. The bulk of aluminum coated sheet is obtained in a soft, satiny finish usually referred to as "regular". Where a brighter surface is required, the "extra smooth finish" should be specified. In addition, aluminized steel is not usually available in "temper designations", but is selected by the mill on the basis of a blueprint of the part to be fabricated.

The weight of the aluminum coating that is applied to both sides of the sheet is approximately 0.50 ounces per square foot, resulting in a coating of about 0.001″ of aluminum per side. It is much thicker than long terne and tin plate coatings and is approximately equivalent in thickness to a 1.30 ounce coating of zinc. The difference in coating weights between the aluminum and zinc coated stock results from the difference in the specific gravity of the two metals.

Properties and Usage

Aluminized sheet is very similar in appearance to a sheet of aluminum; the coating providing such surface characteristics of aluminum as high heat reflectivity and attractive appearance, while the base metal core has both mechanical strength and workability. Typical mechanical properties of aluminized steel, where the base metal is either a low carbon or a copper bearing steel, are given in Table I.

As cited by numerous references[2,3,4] one problem common to all procedures in coating aluminum is the control of the interfacial com-

TABLE I[1]

	Yield Strength, psi	Tensile Strength, psi	Per Cent Elongation in 2 inches	Modulus of Elasticity	Rockwell "B" Hardness
Regular Dull Finish	42,000	54,000	24	29,000,000 psi	66
Extra Smooth Finish	44,000	55,000	21	29,000,000 psi	68

pound of iron-aluminum which is between the base metal and the pure aluminum coating. Thus, in the event that aluminized sheet is purchased for further fabrication by bending, the iron-aluminum compound will impair the ductility of the sheet. Such a sheet, which is primarily used for corrosion resistance, should have a pure coating of aluminum with the interfacial compound being held to a minimum. In a hot dip process, as exemplified by the Armco procedure, it has been stated[2] that the interfacial compound layer can be adequately controlled by the addition of either silicon, copper or beryllium to the molten aluminum bath.

With the addition of about 2.5% silicon there is a rapid decrease in the thickness of this interfacial layer; a thickness reduction of 70% has been given[2] when 2.25% silicon is added to the aluminum bath. When 0.1% beryllium is added to the molten bath, a 50% reduction in layer is realized[2]; an increase of beryllium to about 0.6% of the bath decreases the thickness of the alloy zone another 30%. Although copper to the extent of 15% has an appreciable effect in reducing the alloy layer, it has been stated[2] that the copper additions may interfere with the adherence of the aluminum coating. Both the temperature of the aluminum bath along with the time of immersion of the product must be under strict control.

Fig. 2. In this table top electric oven, the entire oven lining including that of the door, and the reflector for the heating element are fabricated of aluminized steel.

Where the intended application of the aluminum coating is for resistance to oxidation and scaling, the above iron-aluminum compound will be of benefit. However, this compound should not form[3] to such an extent that the surface becomes brittle with subsequent spalling of coating. Intended application has some bearing on the method chosen to coat steel with the protective aluminum. Calorizing, which is a diffusion process involving packing and subsequent heating, produces a surface condition which is only intended for heat resistance. Aluminum coatings as produced by either spraying, electroplating or hot dip will have a deposit of pure aluminum, the interfacial compound being under strict control in the hot dip coating as previously mentioned. This coating will have sufficient ductility to permit forming. However, where heat resistance is the prime requisite, subsequent heating of this coating will produce the aluminum-iron alloy so necessary.

In a hot dip coating, the material will withstand temperatures up to approximately 900° F without discoloring and up to about 1250° F without evidence of destructive scaling[1]. Above 900° F the coating will react with the base metal to form the iron-aluminum compound which is tightly adherent and highly refractory. Tests have shown that this gray surface layer of iron-aluminum alloy[4] will completely protect the steel base from oxidation and scaling during short exposures to temperatures as high as 1750° F.

In regard to the use of aluminum coated steel as a replacement for the highly alloyed heat resisting alloys, each application must be carefully studied as to the conditions prevalent during surface life. Although this material has excellent heat resistance when the coating is in the converted form, it has limitations. It has been used to advantage in such applications as the combustion chamber of oil space heaters, muffler outer shells, flash tubes for pilot lights on gas ranges, combustion chambers of coal burning furnaces and heat exchanger tubes.

Another advantage of aluminum coated steel is that it is an efficient and stable reflector of both heat and light. This quality is attributed to the resistance of the aluminum coating to both oxidation and discoloration below 900° F, and is used to advantage in such applications as the electric toaster, Figure$_1$, the liner for ovens, Figure$_2$, liners for waffle

makers and heating element reflectors. It has been stated[1] that aluminum coated sheet will turn back approximately 80% of the radiant heat that is thrown against it while operating at temperatures up to 900° F.

Panels of aluminum coated steel along with other materials were used as furnace doors and subjected on the inside to closely regulated temperatures of 180°, 300°, 500°, 700° and 900° F. Heat reflectivity was measured by a thermopile at a fixed distance from the outside of the panel. The above mentioned 80% reflectivity varied by only a few percent over the entire temperature range.

The results of this test are shown in Figure 3,[1] the panel materials in the photograph being (A) Black Iron; (B) Blue Ground Coat Enamel; (C) White Enamel; (D) Stainless Steel, No. 2 Finish; (E) Stainless Steel, No. 4 Polish; (F) Stainless Steel No. 7 Polish; (G) Dull Finished Aluminized Steel; (H) Extra Smooth Aluminized Steel; (I) Buffed Aluminized Steel, 3 years old; and (J) Regular Galvanized, newly produced.

Special infra red sensitized film, which was exposed 4 hours, recorded the intensity of heat reflectivity of these materials. The samples were inclined at 45°, with the electrical resistance heating coil directly in the center of the group; the temperature being maintained at 700° F. The camera was placed several feet above the samples and coil. A check by densitometer[1] indicated the following order of specular reflectivity, thus: (1) Stainless Steel, No. 7 Polish; (2) Aluminized Steel, buffed finish 3 years old; (3) Regular Galvanized, newly produced; (4) Stainless Steel, No. 4 Polish; (5) Aluminized Steel, Extra Smooth Finish; (6) Aluminized Steel, Dull Finish; (7) Stainless Steel No. 2 Finish; (8) Porcelain Enamel, white coat; (9) Porcelain Enamel, blue ground coat; and (10) Black Iron, scale finish. Aluminized Steel compares quite favorably.

Aluminum coated steel has exceptionally good rust resistance in sea coast and industrial areas. In regard to the corrosion resistance of this material under such conditions, Finkbone[4] has stated that "tests based on 4 years of exposure in mild industrial atmosphere have shown that aluminum coatings lose approximately one-tenth as much weight as galvanized coatings under the same conditions. Exposure for two years in marine atmosphere has shown that aluminum coatings lose approximately one-fifth as much weight as galvanized coatings." In regard to sheared edge protection, it is stated that aluminum coated steel[4] does not afford the same galvanic protection which is so inherent in zinc coatings, however the rusting of edges on samples submitted to outdoor atmosphere had not been serious in the test as mentioned above.

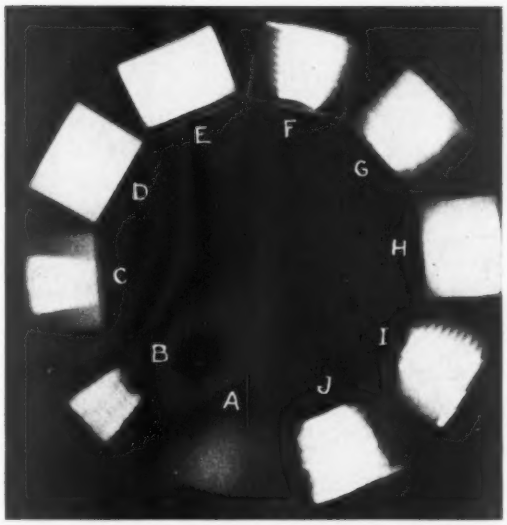


Fig. 3. The setup for running a test on the reflectivity of a variety of materials and finishes. The samples, inclined at 45°, surround an electric heating coil in the center of the group. From above, a camera loaded with film sensitive to infra-red, recorded the relative specular reflectivities. See text for identities of materials and finishes and reflectivity relationships.

Aluminized steels have good resistance where both heat and corrosion are present; a good example of this type of service being a dry kiln fan wall. In a specific installation, where five years service life had been obtained, there was no indication of rusting; the service condition being 180° F in a high humidity atmosphere.

Suggested Procedures for Fabrication

All of the conventional methods of forming metal can be used with success in the forming of aluminum coated steel; these procedures include bending, punching, shearing, press brake forming, moderate press drawing and spinning. Since the material under discussion is a coated product, it must be remembered that great care should be exercised that the coating is not damaged by any scraping action of the dies. In an operation such as bending, consideration should be given to the bend radius. Usually, a 180° bend can be realized without peeling or flaking of the coating provided the bend is made over a diameter which is at least twice the thickness of stock. Likewise, in a forming or drawing operation, the part which is to be drawn or stamped should be designed so as to relieve frictional strains and sharp corners. In addition, adequate die clearances and good lubrication are essential. It has also been suggested[4] that a slow action press be employed in draw work.

Fusion welding processes such as oxy-acetylene, metallic arc, atomic hydrogen arc and the inert gas shielded arc can be used to join aluminum coated sheet. Two conditions which should be met in a fusion welding procedure are: (a) complete fusion of the base metal is required so that the maximum weld strengths can be realized, and (b) excessive oxidation of the coating must be prevented so as to realize the maximum protective powers of the coating. In many instances, standard practices for sheet metal welding as to procedure, joint design, etc. can be followed; butt, lap, flange and corner joints being employable. In addition, provisions for maintaining alignment, particularly on long seams, are advisable.

In oxy-acetylene welding, due to the presence of an aluminum oxide film on the surface of the material welded, a protective fluxing agent is advisable so that this oxide will float to the surface as slag. A recommended fluxing agent[1] is Solar welding flux No. 16 GH which is made by Solar Aircraft Company. This flux can be applied directly to the weld joint as a paste by mixing the prepared powder with technical grade methanol which has a water content of less than 2%. Other recommended fluxing agents[1] include Krembs and Company's Fluxine No. 18 and Airco Flux No. 34. When making a butt weld, it is advisable that both the top and bottom side of the weld joint be fluxed before welding.

For best results, when depositing additional metal to form the weld, the welding rod should also be fluxed with this same paste. One welding rod that has been tested and found satisfactory[1] is Oxweld No. 1 HT which is produced by the Linde Air Products Company. This is identified as a high test rod which will give weld strengths up to 65,000 psi. The removal of residual flux after welding is essential since the chemicals within the flux, especially in the presence of moisture, will be corrosive to both the weld and adjacent metal.

Shielded arc electrodes are essential when welding this material by the metallic arc welding method. A mild steel coated rod by the trade name of Raco Fer-al has been developed[1] by the Reid-Avery Company. The atomic hydrogen arc welding method is used for the welding of the lighter gages of aluminized steel. This requires a welding flux of the same type as used for oxy-acetylene welding. Where a filler metal is used, the flux is painted on both the rod and the joint prior to welding. In the inert gas metal arc welding procedure, either helium or argon performs the function of a shielding gas. When filler metal is required, the Oxweld No. 1 HT rod is recommended[1].

Of the welding procedures available for joining, both spot, Figure 4, and seam resistance methods are used. Due to the coating, procedures employed in resistance welding resemble those used for aluminum rather than for steel. One of the more important considerations is that of cleaning. Where the material is spot welded in the form as it comes from the mill, satisfactory welds may be obtained without pre-weld cleaning[1]. However, where the sheet is to be fabricated to a specific shape, size or form, which undoubtedly will necessitate the use of a lubricant or excessive handling, a cleaning procedure is usually required so as to remove this soil.

Grease, oil and finger stains may be removed by the use of a solvent such as naptha or carbon tetrachloride. Chemical or mechanical removal of the aluminum oxide coating on the surface may be used, but with the alumi-

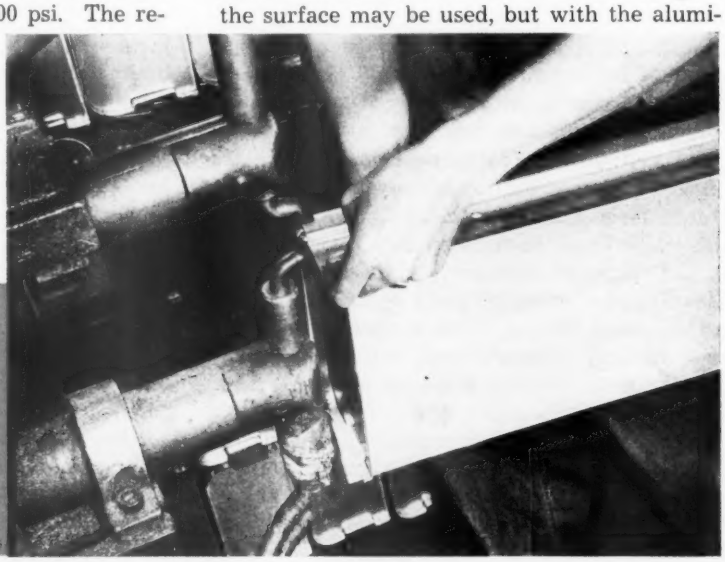


Fig. 4. The best results in spot welding the aluminized steels are obtained with "domed" rather than flat electrode surfaces. This minimizes "pick up" of the aluminum coating by the electrodes.

Table II[1] Aluminized Steel Spot Welding Data (For 50 KVA, A.C. Machine)

Sheet Thickness, Inches	Minimum Electrode Diameter and Shape, Inches: Lower Electrode d	Minimum Electrode Diameter and Shape, Inches: Upper Electrode D	Net Electrode Force, Pounds	Weld Time, Cycles (60 per sec.)	Approx. Current, Amperes	Minimum Weld Strength, Pounds	Approx. Diameter of Fused Zone, Inches
0.020	5/8"—1"R	5/8"—1"R	350	8	8700	295	0.13
0.025	5/8"—1"R	5/8"—1"R	400	9	8700	420	0.14
0.030	5/8"—2"R	5/8"—2"R	450	9	9500	545	0.16
0.040	5/8"—2"R	5/8"—2"R	550	11	10400	920	0.19
0.050	5/8"—2"R	5/8"—2"R	700	12	11800	1350	0.22
0.060	5/8"—2"R	5/8"—2"R	900	14	13000	1765	0.25
0.080	5/8"—2"R	5/8"—2"R	1200	18	13800	2795	0.29

Notes: (a) Material free from scale, grease and dirt.
(b) Electrode Material: minimum conductivity at 75% of copper; minimum hardness at 75B Rockwell.
(c) Electrode is dome shape as indicated. Radius of dome and diameter is given for both upper and lower electrodes.
(d) It is advisable to make final machine setting with a slight amount of copper-aluminum alloy on the electrode tips, since the spot welding will be done with the tips in this condition.

num coated steels care must be exercised since the coating is relatively thin. Above all, strong alkali cleaners should be avoided since attack of the coating will result. In many instances, a light pass with a power driven brush will effectively remove this oxide coating so that the surface will have a low and uniform contact resistance. In addition, this practice will minimize both expulsion and pick up of weld metal.

Highest weld strengths and best weld consistency have been reported [1,5] when there is an approximate two inch dome radius on both top and bottom electrodes. Apparently, the oval shaped nugget that is produced has minimum porosity in the weld compared to a similar spot weld made with flat tips. Hard drawn copper electrode tips are to be avoided since they will not maintain their contour in production welding. Suggested electrode tip materials[1] are Mallory 3, Elkaloy A, Electroloy XX and S.M.S. Alloy 103.

One difficulty experienced in the use of small radius domed tips is that indentation may be more severe than that experienced with uncoated steels of the same thickness. This is primarily due to the unavoidable expulsion of some of the coating material. To avoid this excessive indentation, a greater tip radius may be used on one side. It has been reported[1] that a large aircraft manufacturer had excellent results with the following tip data: in the welding of aluminized steel 0.018" and 0.024" thick, a top tip of 3/16" diameter and 3" dome radius had been used with success in conjunction with a bottom tip of 5/8" diameter and 10" dome radius.

In order to minimize pick up of copper deposits from the tip to weld, along with attainment of maximum tip life, water or refrigerant cooling of electrodes is essential. As in the welding of aluminum, pick up of aluminum onto the electrodes is to be experienced; this necessitating periodic removal for the production of good spot welds. Usually, under the most favorable conditions, 100 spot welds can be made before tip dressing is required. Thus, when tip dressing, No. 160 or No. 240 Aloxite abrasive cloth is suggested,[1] care being taken to maintain the original shape of the dome.

Suggested spot welding data is given in Tables II and III. As indicated, due to the higher electrical conductivity of the coating,

TABLE III[1]

Material Combination	Electrode Force
0.018" Aluminized to 0.018/0.024" Aluminized	625 to 700 lbs.
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0.018" Aluminized to 0.018/0.037" Stainless Steel	950 to 1000 lbs.
0.024" Aluminized to 0.024" Aluminized	625 to 700 lbs.
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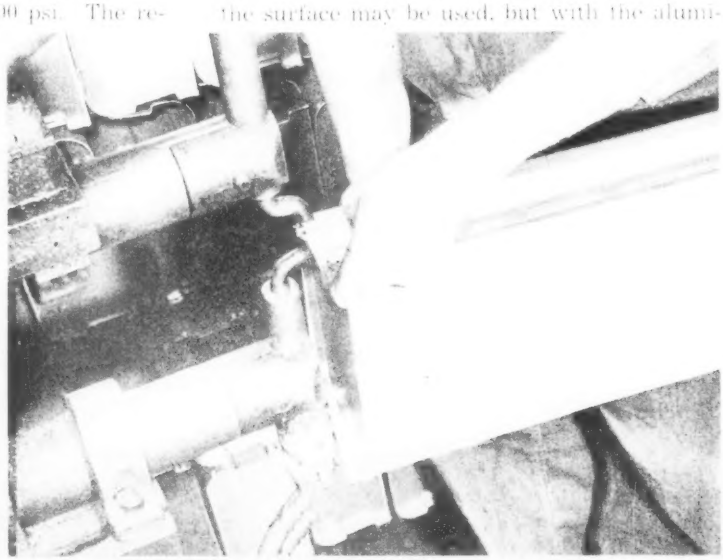

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One difficulty experienced in the use of soft copper dented tips is that indentation is to be more severe than that experienced on uncoated steels of the same thickness. This is primarily due to the unavoidable expulsion of some of the coating material. To avoid this excessive indentation, a greater tip radius may be used on one side. It has been reported[2] that a large aircraft manufacturer had excellent results with the following tip data: in the welding of aluminized steel 0.018" and 0.024" thick, a top tip of 3/16" diameter and 2" dome radius had been used with success in conjunction with a bottom tip of 5/8" diameter and 10" dome radius.

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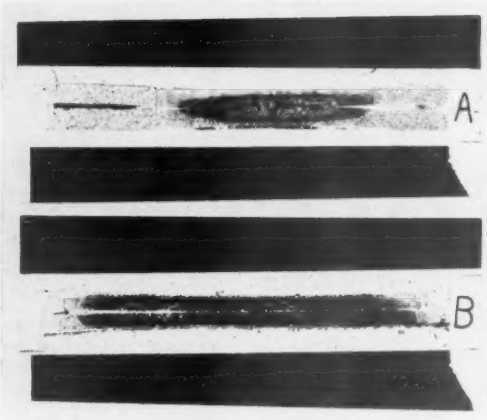


Fig. 5. These photomacrographs of two welds show the difference attributable to the use of "domed" vs flat electrode surfaces. At "A" the domed electrodes produced greater pressure and increased current density within the weld area. The unsatisfactory weld at "B" was made with flat electrodes, the same electrode pressure, approximately the same welding time, and triple the amperage. The photomacrography magnification of A is 16x; B is 11x.

greater electrical energy input is required than for uncoated steels of the same thickness; the increase of electrical energy being dependent upon the gage to be welded. Thus, in very thin sheets, 0.018" and lighter, the amperage requirements will be about 70% greater than for uncoated material of the same gage. As the gage increases the additional current required decreases, so that for a sheet thickness of 0.080", the current required will be but 30% greater than for the uncoated material of the same gage.

One procedure suggested by Armco, utilizing an alternating current spot welding machine of 100 KVA rating, is as follows:

(a) Adjust the current duration to 2 cycles. A longer duration increases flashing, spitting and tip indentation.

(b) Adjust the squeeze time and hold time to values that give the desired rate of welding. The value of these quantities does not seem to affect the welds.

(c) Adjust the electrode force to the values given in Table III for the specific combination to be welded.

(d) Adjust the transformer tap setting and the heat control dial for a low value of current. Produce some 30 or more welds in scrap material, increasing the current until excessive flashing and spitting occurs. Then gradually decrease the current (heat dial) until spitting stops. Even this current setting will be high in comparison to that required in the welding of the uncoated material of the same gage. It is then suggested that spot welds be made on test strips for approval of procedure.

A panoramic view of two spot welds on 0.022" thick aluminum coated steel is shown in Figure 5. The weld in Figure 5A is satisfactory; a one inch dome radius was used on both top and bottom electrodes. The successful weld is attributed to the concentrated pressure obtained with the domed electrodes along with the increased current density within the welded area. It is interesting to note that this concentrated pressure has also caused a "squeezing out" of the aluminum coating between the two welded sheets.

In contrast to the above mentioned weld, Figure 5B is typical of a poor weld. Although the electrode pressure was the same, the amperage three times as great, and the welding time approximately the same as that illustrated in Figure 5A, the weld is unsatisfactory due to the fact that flat electrode tips were used on both top and bottom electrodes. Evidence of poor welding is the fact that a white, apparently unbroken line of coating can be seen between the two sheets. Although

. . . *Continued on page 144*

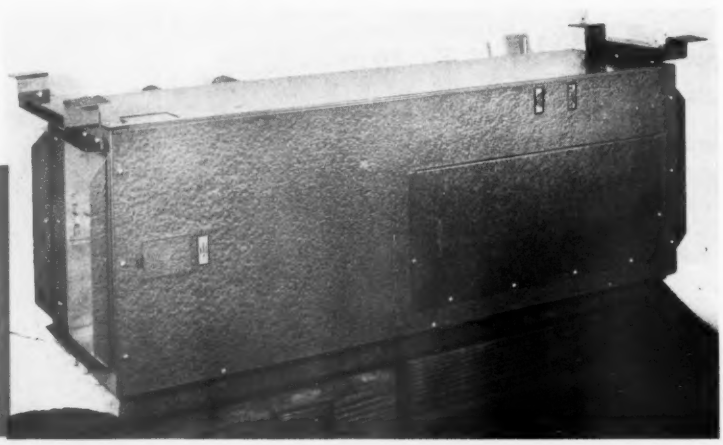


Fig. 6. This zone heater cabinet exemplifies the application, after buffing, of a lacquer finish on an aluminum coated steel surface.

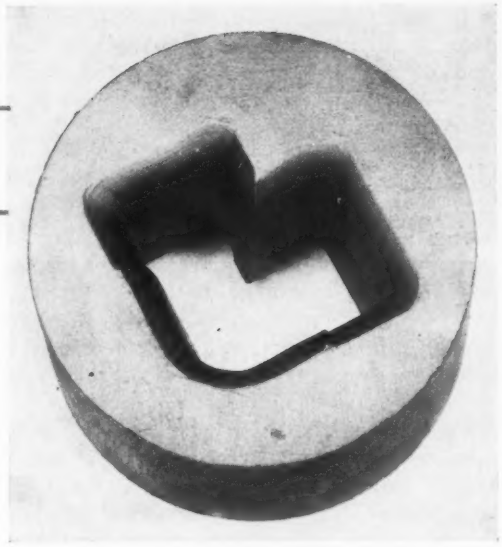


Fig. 1. Solid carbide die is hot pressed close to finish size, reducing by many hours the time required for finishing operations.

by John L. Ellis
Chief Engineer
SINTERCAST CORPORATION
OF AMERICA
Yonkers, New York

HOT PRESSING DEVELOPMENTS

Produce Close-Tolerance Carbide Shapes

SMOOTHER SURFACES and even closer tolerances on hot pressed tungsten carbide parts are now made possible by an improved production technique. It has previously been demonstrated* that the regular hot pressing technique offered advantages over cold pressing and sintering in quality, size control, and finishing costs, especially when manufacturing individual pieces of intricate shape. The improved hot pressing technique — by providing a silky, smooth, dimensionally controlled surface free of the dimples, depressions, and surface irregularities common to regular hot pressed carbide products — provides even more reasons why hot pressed carbides in many cases are superior to cold pressed and sintered carbides.

In Sinterforge SF (Superfinish) parts, smooth and dimensionally controlled surfaces are produced on those faces of the article that require close tolerances in the finished product. Thus, in a drawing die, an improved surface would be created in the approach and in the bearing where the best finish and greatest accuracy are required. On a mandrel tip or a powder metallurgy core rod, the special finish would be applied to the external surfaces.

This super-smooth surface makes possible the manufacture of carbide components with reduced machining allowances. When specifying the amount of finishing stock allowance that should be removed in grinding a certain article, the possible irregularities of the surface must be considered so that grinding will clean up uniformly the entire area of the die or wear part. The smoother the surface, the less allowance is required. Narrow tolerances in the "as hot pressed" article further reduce grinding allowances, and this too has been accomplished with the improved process.

It is easy to see the advantages of this method to the toolmaker. The grinding of tungsten carbide products is a slow and expensive operation. Generally in diamond grinding or in turning (chipping) outside cylindrical surfaces, not more than 0.0005″ to 0.002″ of material can be removed in a single pass. Much less stock per pass can be removed in internal grinding operations, particularly when small hole diameters necessitate the use of small grinding wheels.

In one case of a tungsten carbide ring of 4½″ O.D. x 3.405″ I.D. x ⅝″ height, the normal stock allowance for finish grinding the inside diameter was 0.015″ to 0.020″ per side. With the Sinterforge SF ring, the machining allowance was reduced to 0.007″ to 0.008″ per side, and the customer reported savings in grinding time alone of 3 to 3½ hrs per ring. The con-

* John L. Ellis, "Hot Pressing Produces High Strength Carbides", Tool & Die Journal, Feb. '51, Mar. '51.

sumption of diamond wheels or other diamond tools is an important factor in the operation, and introduces a cost factor that must be taken into consideration along with the wages of the machine operator.

In another case, a tungsten carbide cylindrical bushing was manufactured for a powder metallurgy cold coining die. The dimensions were 1½" O.D. x 1.000" I.D. x 2½" long. In conventional hot pressing practice, the machining allowance on this bushing would have been 0.008" to 0.010" per side, whereas with the improved process, the allowance was reduced to 0.003" per side. In this case, the internal grinding operation was entirely eliminated and the die was directly lapped to the desired size. The time saving effected by elimination of the internal grinding operation, including setup, amounted to 3 hours on this task.

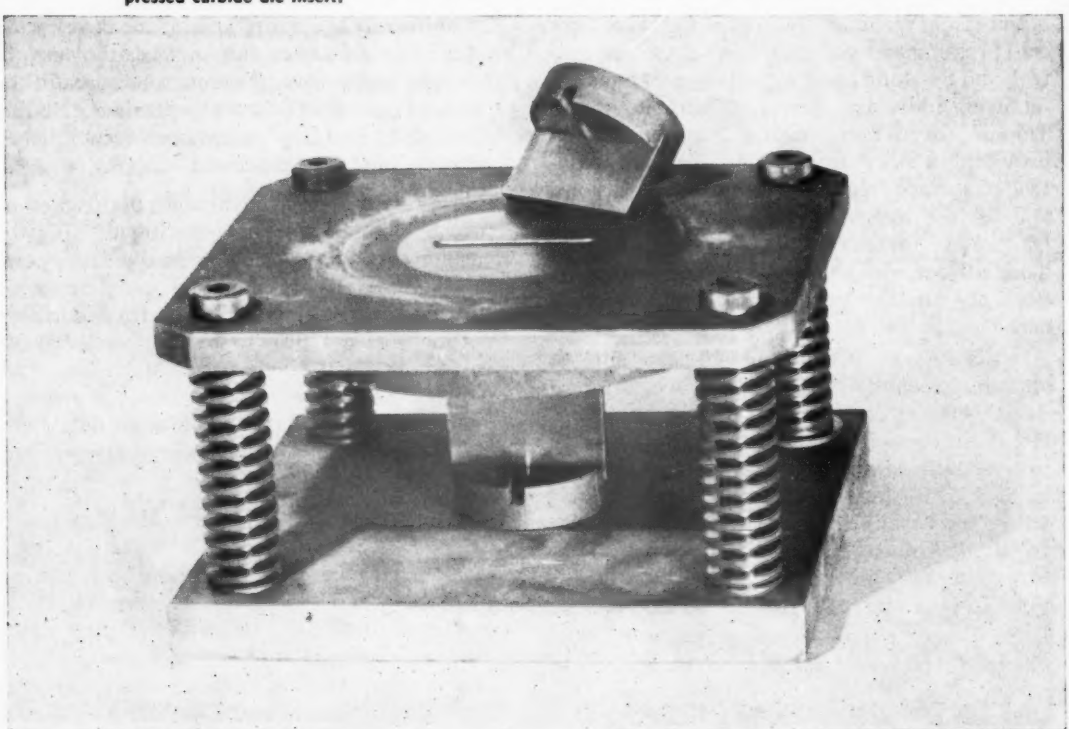
SF carbides are of importance for components such as shape dies, which, because of their configuration, cannot be finished by cylindrical or surface grinding techniques. These shape dies, one of which is shown in Figure 1, require a hand lapping operation with special form laps, a procedure that is much slower and costlier than the machine diamond grinding process. Many years are required to train diemakers for this lapping operation, and the output of these men is very limited. Sintercast's hot pressing process would materially decrease the amount of lapping work that must be done, because the "as pressed" article would be close to finish size.

Figure 2 shows a typical powder metallurgy floating die assembly which serves to uniformly compact powders in a single action hydraulic press in such a manner that both the top and the bottom compacting punches contribute equally to the compression of the powder mass. Because the powders that were to be pressed in this die were highly abrasive, it was decided to specify a tungsten carbide insert.

The Sinterforge SF insert had an O.D. of 3¼", a height of 1", and a prismatic die cavity that finished to 0.200" x 2.060". To facilitate the ejection of the pressed compacts from the die, a taper of 0.002" was provided. The "as hot pressed" rough-cored die insert was made so as to allow 0.003" lapping stock per side, and the die cleaned up in the finish lapping operation to proper tolerances and surface finish in 4¾ hrs.

Sinterforge SF is available in all tungsten carbide compositions conventionally used in hot pressed products. The compositions vary in content from about 6 to 20% cobalt. The so-called binder "sweatout", which is more pronounced with the cobalt-rich compositions, can be materially reduced when utilizing this new process. This would tend to reduce porosity and improve uniformity of structure.

Fig. 2. Only 0.003" lapping stock allowance was required in the cored opening of this hot-pressed carbide die insert.



ANOTHER EXAMPLE of
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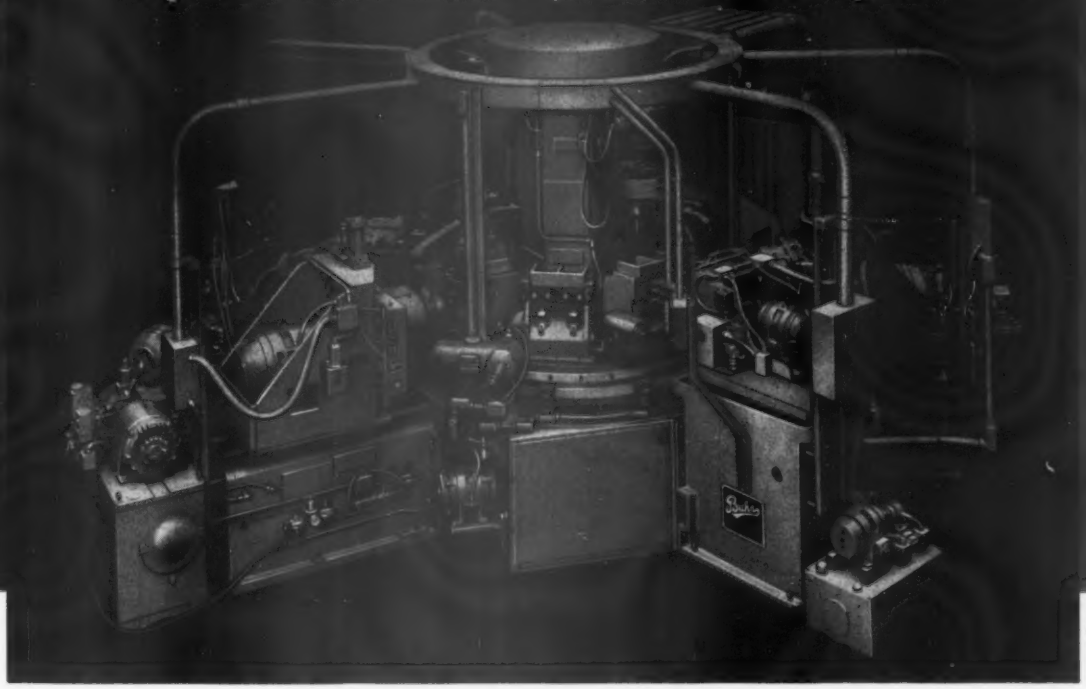
Buhr ECONOMATION

Mills, core-drills, drills, semi-finish bores, chamfers and taps 288 master-brake cylinders an hour gross!



Rough castings are loaded in pairs in this 10-way 7-station hydraulic-feed center-column Machine.

Equipped with 72″-diameter 7-position automatic power-driven heavy-duty index table, complete with two shot bolts.

For extreme ease of servicing and maintenance, automatic indexing unit slides out *without removing table.* This is done simply by detaching cover on front of Machine.

Other features of Machine include automatic hold-down clamp at rough-and-finish milling station, automatic rotating chip conveyor, power clamping and automatic lubrication.

Buhr
MULTIPLE-SPINDLE
HIGH PRODUCTION MACHINERY

Let us show you how* Buhr Economation *can reduce your production costs. A phone call, wire or letter will bring you a prompt consultation with one of our top sales executives.

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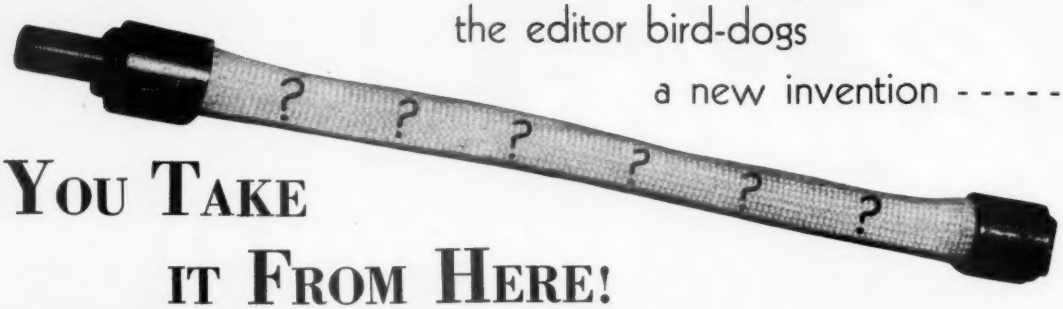
Solidly Engineered • Precision Built • for World's Leading Manufacturers

the editor bird-dogs
a new invention - - - - -



YOU TAKE IT FROM HERE!

OUT OF A RESEARCH laboratory has come a rather sensational device that is destined to have a terrific impact in any industry where application can be made of the conversion of a hydraulic or pneumatic pressure into forceful mechanical movement. This means lifting, pulling, or squeezing under conditions of most sensitive control. It, in effect, is a rope that shrinks at the touch of a button or valve.

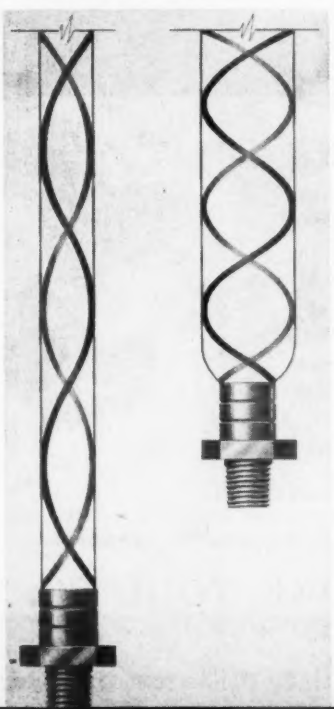
Sparked by a need to evolve a mechanical device which could be used to simulate the physical characteristics of the human muscle, i. e., force, strength, resilience, and equilibrium the "Clevite Muscle" is the essence of simplicity and foolproofness — no cylinders, pistons, rings, or seals are involved—it can't help but work.

As illustrated, the Clevite Muscle consists of a Neoprene tube of any desired length secured by compression fittings at each end to a braided Nylon cover or sheath. The Nylon cover is woven so that each individual strand makes two spiral turns around the circumference of the Neoprene tube in approximately eleven inches—a helical pitch of about 5½".

At one end of the "rope" a simple 3-way control valve permits the introduction of air (at shop pressure) or water (city water supply pressure). The resultant pressure increases the diameter of the Neoprene tube and its Nylon "skin", and as the diameter of the braided Nylon rope **increases**, the helix angle of the weave **decreases**, thus effecting a shortening of its over-all length. Hence, with one end of the Muscle anchored, the other end has to move, and does so to the extent of a 20% shrinkage in length.

This simple "mover" can be applied to any job from jogging an automobile body onto its chassis to loading a heavy piece of work between lathe centers; from "spotting" a boxcar at a loading platform to compressing a spring in order to position it in an assembly, or as an automatic door-opener.

One overwhelming advantage of the Muscle is that when holding a load in a state of equilibrium, it has a degree of resiliency so that only finger tip pressure is needed for that last fractional inch of "on the nose" positioning. Obviously, valving of the pressure lengthens the rope for releasing the load or diminishing the force. Depending on the application, the control valve can be at either the fixed or moveable end of the rope; strictly a matter of convenience.—*E. W. P.*



When any fluid pressure medium — air, water or oil — is applied to the Neoprene tube, the expanding diameter of the tube acts to decrease the helical angle of the Nylon weave, hence a shortening of the "rope". Shorten a rope and something has to happen; in the case of the Muscle — work is accomplished.

A single Muscle normally is used for lifting or pulling objects needing a force of up to 200 lbs ; multiple Muscles are paralleled for exerting greater forces.

teamwork...

that turns BLUEPRINTS into BETTER MACHINED parts

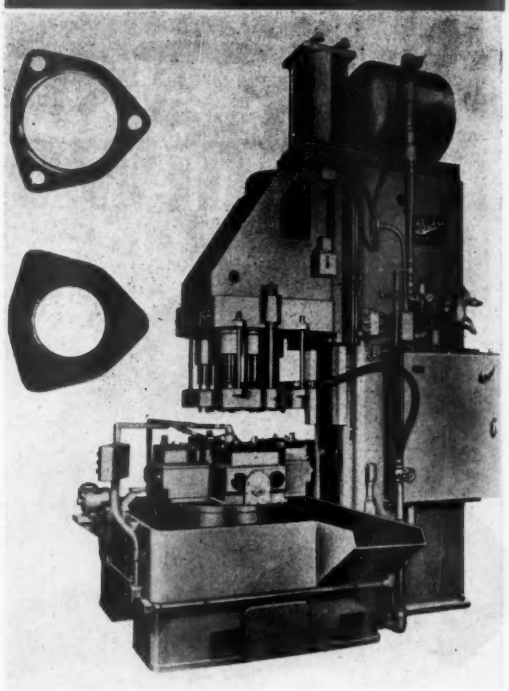
GIDDINGS & LEWIS and ROCKFORD DIE & TOOL WORKS, Inc.

in greater volume at lower cost...

Our approach to the problem of producing your parts at lower cost, with finer tolerances starts with matchless perfection in equipment. • Our new Model 300-T Giddings & Lewis Horizontal Boring, Drilling, and Milling machine is an important part of that equipment. Advantages such as variable speeds from 7 to 1600 RPM, plus 23 milling feeds; headstock, table and saddle operating independently — up or down — right or left — forward or reverse at separate, adjustable feeds, enable us to produce job lot quantities on a production basis. • The ultimate in equipment, highly skilled workmen, and extremely rigid standards make an unbeatable team . . . makes America great. • If you have a cost or quality problem on parts, send us a sample or the prints — chances are we can help. Write today for our facility brochure and equipment list — no obligation, of course.

ROCKFORD DIE AND TOOL WORKS, INC.
1816 SEVENTEENTH AVE. • ROCKFORD, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 711



Drill head is balanced by air on this Buhr Special Machine for boring, drilling, and chamfering two pieces at a time, at a rate of 329 pcs/hr.

Heavy Counterweight Assemblies Are Eliminated by

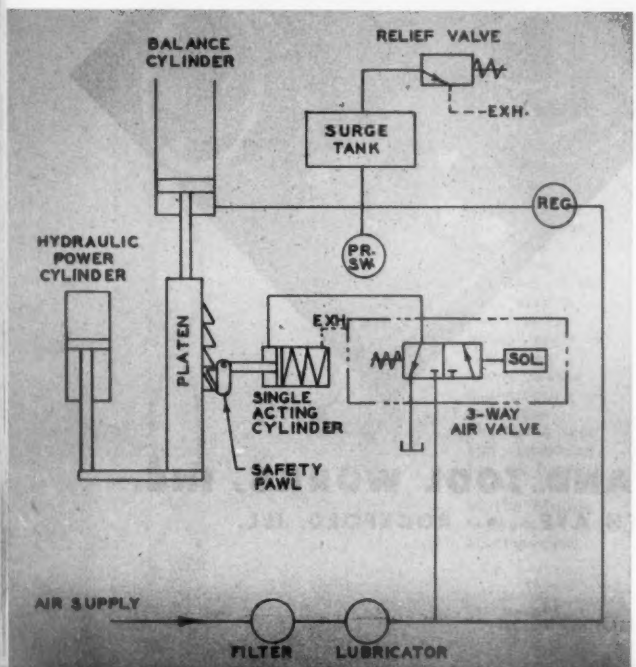
AIR BALANCE SYSTEM

DESIGNED TO REPLACE the conventional cast-iron or lead counterweights on vertical machine tools similar to that shown, an air counterbalance system was recently introduced by Buhr Machine Tool Company of Ann Arbor, Michigan.

According to Edward A. Farwig, Buhr's Chief Engineer, a primary purpose in developing the system was to eliminate the danger of possible chain fatigue which would cause the heavy counterweights to drop and, in some cases, result in serious damage to the machine. Additional advantages of the new system are the provision of a smooth, quiet operation and reduction in the over-all weight of the machine. Numerous items including counterweights, chains, sprockets, and sprocket shafts are eliminated.

On Buhr vertical machines equipped with the new counterbalance system, an air cylinder is coupled to the platen providing a holding force that affects the gravity pull of the multiple-spindle head. The air cylinder diameter is selected to provide a normal operating air pressure in the 40-psi range. A pressure regulator in the air line permits an **exact** balance of the drill head mounted to the platen. A surge tank of approximately three times the air cylinder volume is provided to compensate for fluctuations in the line pressure.

Safety features include a latch arrangement for locking the platen in place. Through interlocks in the control circuit, hydraulic pressure actuating the platen is automatically removed and the platen locking latch engaged should the air pressure fall below a pre-determined safe level. Additional interlocking prevents the application of hydraulic pressure while the platen-locking latch is engaged.



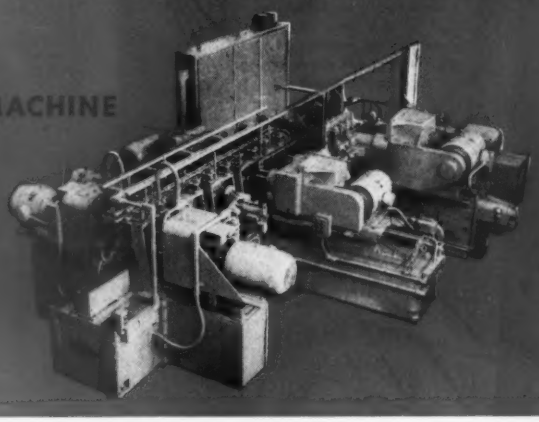
Schematic sketch (left) of the Balance System pneumatic circuit.

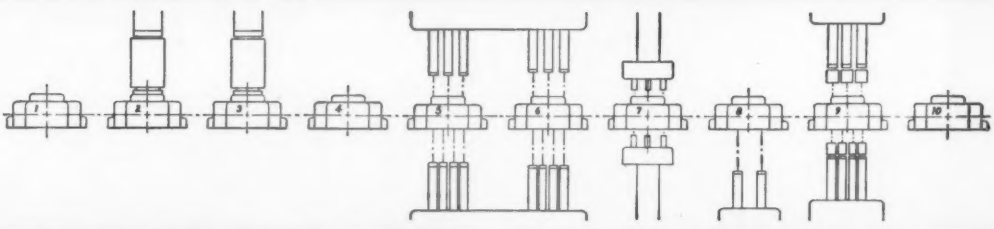
10 Station Automatic In-Line BAKER TRANSFER MACHINE

Performs Multiple Operations on Tractor Housings

THE PART

THE MACHINE





THE OPERATIONS

STATION NO. 1
LOAD 1 PART

STATION NO. 2
UNIT NO. 1
COMB. SEMI. FIN. BORE 5.165 & 3.249 & 2.861 DIAS.
COMB. SEMI. FIN. BORE 4.425 THRU BOTH WALLS

STATION NO. 3
UNIT NO. 1
COMB. FIN. BORE 5.180 & 3.264 & 2.876 DIAS.
COMB. FIN. BORE 4.440 THRU BOTH WALLS

STATION NO. 4
IDLE

STATION NO. 5
UNIT NO. 2 "U" DRILL 5 HOLES
31/64 DRILL 6 HOLES

UNIT NO. 3 31/64 DRILL 8 HOLES
21/32 DRILL 1 HOLE
"U" DRILL 6 HOLES
23/32 DRILL 1 HOLE

STATION NO. 6
UNIT NO. 2 ½ CHAMFER 5 HOLES
⅝ CHAMFER 6 HOLES

UNIT NO. 3 ⅝ CHAMFER 7 HOLES
13/16 CHAMFER 1 HOLE
½ CHAMFER 6 HOLES
23/32 DRILL 1 HOLE
COMB. COUNTERBORE .796 & CHAMFER 1 HOLE

STATION NO. 7
INSPECTION

STATION NO. 8
UNIT NO. 4
.6910 REAM 1 HOLE
.8157 COUNTERBORE 1 HOLE

STATION NO. 9
UNIT NO. 5 7/16-14 N.C. TAP 5 HOLES
9/16-12 N.C. TAP 6 HOLES

UNIT NO. 6 7/16-14 N.C. TAP 6 HOLES
9/16-12 N.C. TAP 7 HOLES
½-14 N.P.T. TAP 2 HOLES

STATION NO. 10
UNLOAD 1 PART

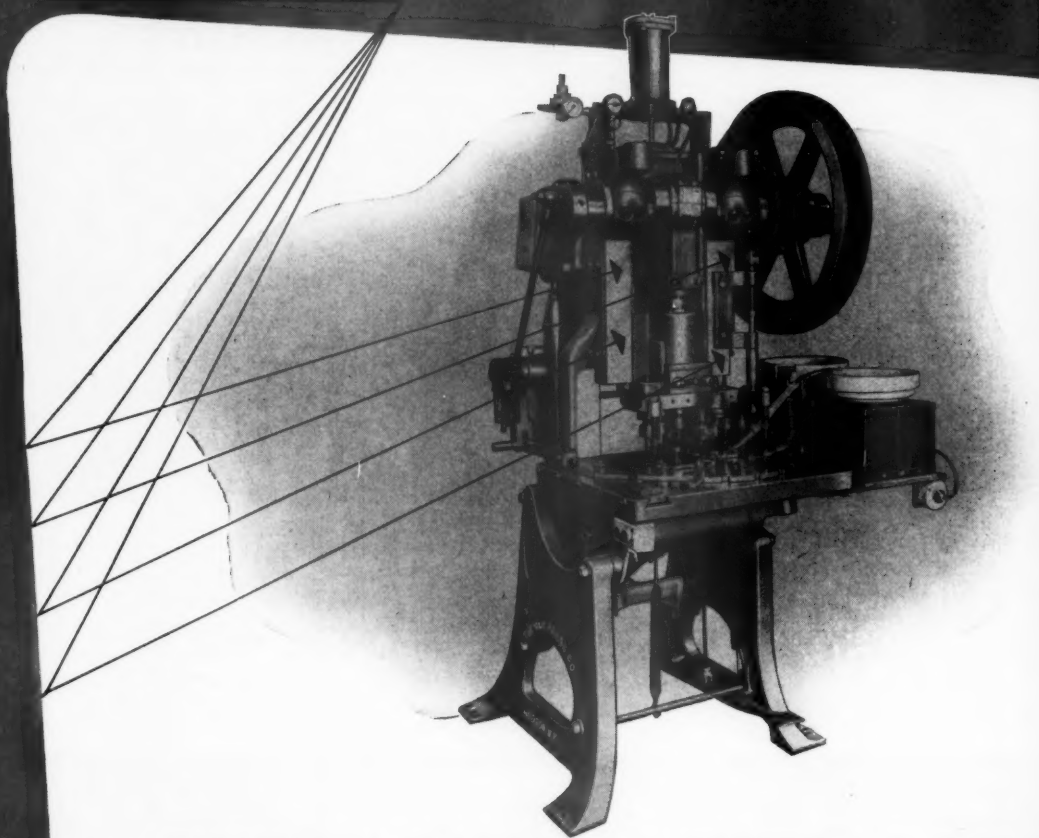
Whatever Your Specific Job Problem, Consult Baker Engineers. Write

BAKER BROTHERS, INC., TOLEDO, OHIO

DRILLING - TAPPING - TESTING - CONTOUR GRINDING MACHINES

CIRCLE INFORM-A-GRAM KEY NO. 731

Precision presswork (AND COST REDUCTION) starts here where V & O leads



And has led for more than 65 years. Slide lengths in V & O's are two to three times longer than usual in O.B.I. presses. But that's only part of the story. To assure the full benefits of long slide precision, V & O builds the rest of the press to the highest machine tool standards. Slides and bearings are hand-scraped. The pneumatic clutch is the most advanced available. Rugged construction assures the extra-rigidity so essential to precision presswork.

For presses equipped and automated to perform specific jobs, consult V & O. For presses that are easiest for your own toolmakers to automate or equip, make sure they're V & O's.

Only the best is good enough

THE V&O PRESS COMPANY DIVISION
HUDSON, NEW YORK

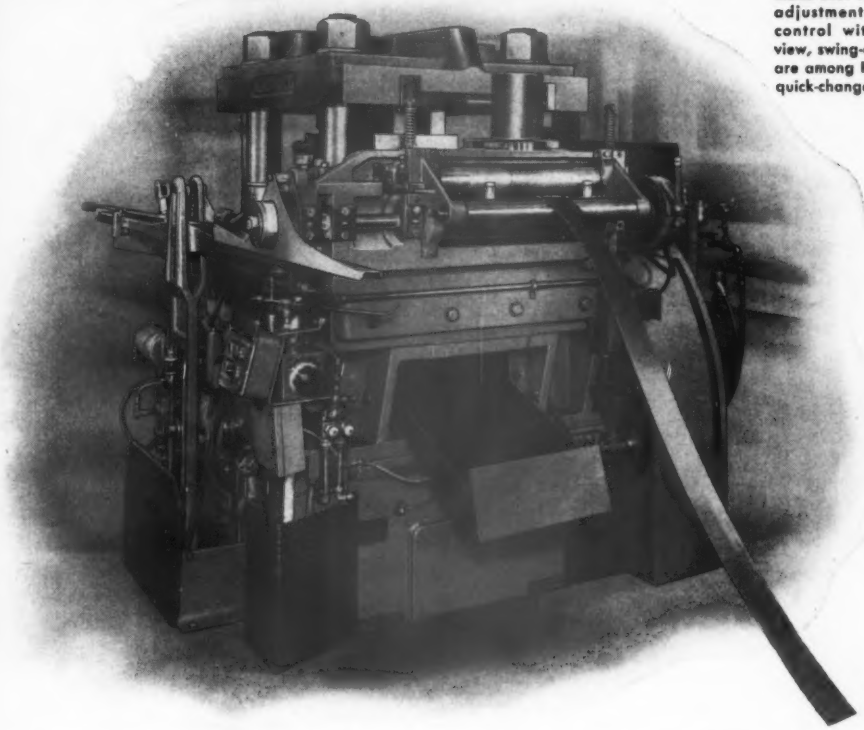
Our representative will be glad to give you the complete story about V & O presses and engineering services. For more information please write for our catalog.

EMHART

CIRCLE INFORM-A-GRAM KEY NO. 741

Two to three die changes a day

HENRY & WRIGHTS COMBINE HIGH SPEED OPERATION WITH HIGH SPEED JOB CHANGE



Open construction, easy-to-make shut height and feed adjustments plus inching control with die in full view, swing-away roll feeds are among Henry & Wright quick-change features.

As many as two to three job changes in a day are being made by companies taking advantage of the quick-change features of Henry & Wrights. These companies report sharply reduced costs on short runs. A contract plant said it had greatly improved its competitive cost situation and was re-bidding on jobs previously lost.

Their unique quick-change features are just some of the reasons why Henry & Wrights rate preference in modernization programs. Other advantages are high speed with minimum vibration, precise alignment of punch and die, quick-stop pneumatic clutch, overall rigidity—and the assurance of longer die life.

Only the best is good enough

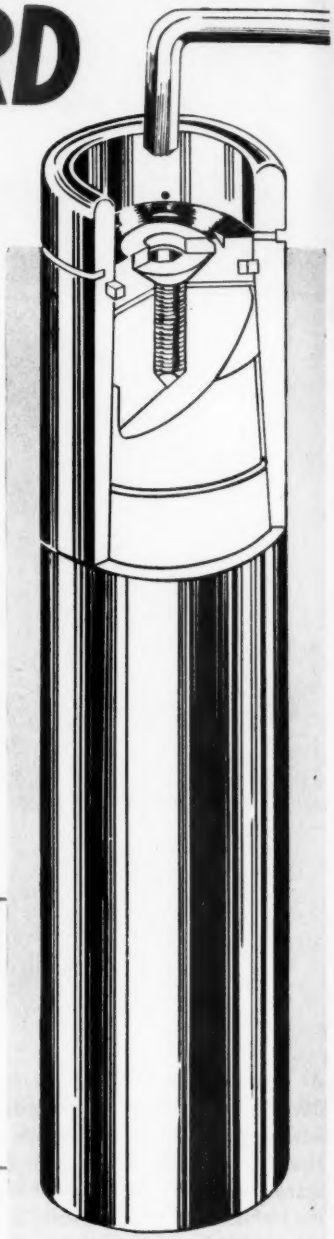
You owe it to yourself to get the complete story about Henry & Wrights and how they can improve your stamping methods. Our representative will be glad to give you the details.

HENRY & WRIGHT DIVISION
760 WINDSOR STREET, HARTFORD, CONNECTICUT

MFG. CO.

CIRCLE INFORM-A-GRAM KEY NO. 751

NOW...STANDARD ON SUPERIOR DIE SETS!!



SUPERIOR

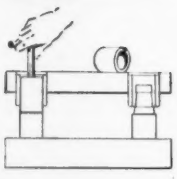
REMOVABLE CAP GUIDE PINS

End Troublesome Binding in Die Set Assembly

Superior's Removable Cap Guide Pins eliminate punch holder binding on guide posts when parting dies. The cap is removed from the pin merely by loosening a socket head screw which holds the cap in place. This frees the punch holder at the most critical point of the pin where it is apt to cock or bind. Instead of needing 2 or 3 die makers to remove the punch holder from a set, one man can easily do this work alone in a few minutes.

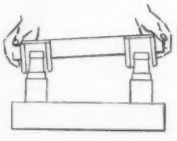
NOW OFFERED IN PIN DIAMETERS OF 1¼" UPWARD, AS STANDARD EQUIPMENT ON ALL SUPERIOR DIE SETS. SPECIFY IF DESIRED. WRITE FOR COMPLETE FREE INFORMATION.

FAST



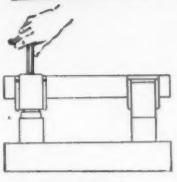
REMOVING CAP

SAFE

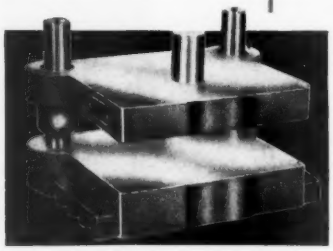


PARTING DIE SET

ACCURATE



REPLACING PUNCH HOLDER



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SUPERIOR STEEL PRODUCTS CORP.
2754 S. 19th ST., MILWAUKEE, WIS

CIRCLE INFORM-A-GRAM KEY NO. 761

SOLID CARBIDE TAPS

Make Broad Production Gains

TAPPING WITH CARBIDE has progressed to where plant management can expect the same benefits here as it enjoys from carbide tooling on turning, boring, milling, and reaming operations. The successful application of solid carbide taps to the production of threads in highly abrasive materials has become a matter of record, and is another important step forward in achieving full carbide benefits . . . PLANT-WIDE.

Cemented carbide taps are believed to have been first employed in production about 10 years ago . . . in the Ceramic Industry, where they were successfully used to produce threads in the small porcelain components of tubular shape used extensively in the electrical and electronic fields. The reduction in price of these components made possible by the economic use of carbides, with production runs in the millions, is a contributing factor in the rapidly booming electronic field today.

Currently, carbide taps are being used by an increasingly-large segment of industry to produce threads in such materials as die castings, powdered metals, plastics, laminates, densified fibre, and cast iron — as well as in some stainless steels and other materials that have proved too highly abrasive for high-speed steel tools.

There are believed to be just two volume manufacturers of solid carbide taps supplying the present demand. A continually greater demand for solid carbide taps is expected to result in new and more economical ways being found to produce them, and even the development of special machine tools for their manufacture.

With the great strides presently being made by producers of the cemented carbide metal, it is not inconceivable to expect the development of new and better grades of carbide that embody higher torque strengths as well as toughness, while retaining a high resistance to abrasion. Such grades may at some time in the future permit carbide taps to be used on the general run of steel-cutting applications and on the tougher, high heat resistant metals used in jet engines.

Carbides Tap Abrasive Ceramics

Solid carbide taps are being used profitably for production quantities of ceramic insulators and forms at Centralab, a Division of Globe-Union Inc. The Centralab ceramics division manufactures steatite, cordierite, electrical and zircon porcelain insulators and ceramic capacitors of high quality for the electrical and electronics industries.

Ceramic materials are tapped before being fired. At this stage in manufacture, the ceramic is chalky and can be cut easily. However, the material is highly abrasive. Solid carbide taps show a minimum of wear compared to other tools . . . 10 to 30 times more pieces than with steel . . . before needing sharpening. See Figure 1. Since much of the production equipment at Centralab is automatic, the longer-lasting tap reduces costly change-over and downtime.

Carbides Tap High-Silicon Die Castings

A solid carbide tap has turned in a remarkable performance in production of a high-silicon, aluminum alloy die casting (Fig. 2) at the Barber Die Casting Co. Ltd. of Hamilton, Ontario.

Originally a h.s.s. tap was used to tap the 1.6-20 L. H. class 2 thread, ¾" deep, producing approximately 1,500 pcs between sharpenings. The plant then changed over to a Walter T. Cole Co. solid carbide tap, with which 45,000 to 60,000 castings were obtained between sharpenings. To prevent tap breakage or excessive tap wear, a standard of 45,000 pcs/grind was established.

Further advantages obtained were:

Fig. 1. Centralab standoff insulator made to government (JAN) specifications, using a Walter T. Cole Co. solid carbide tap.

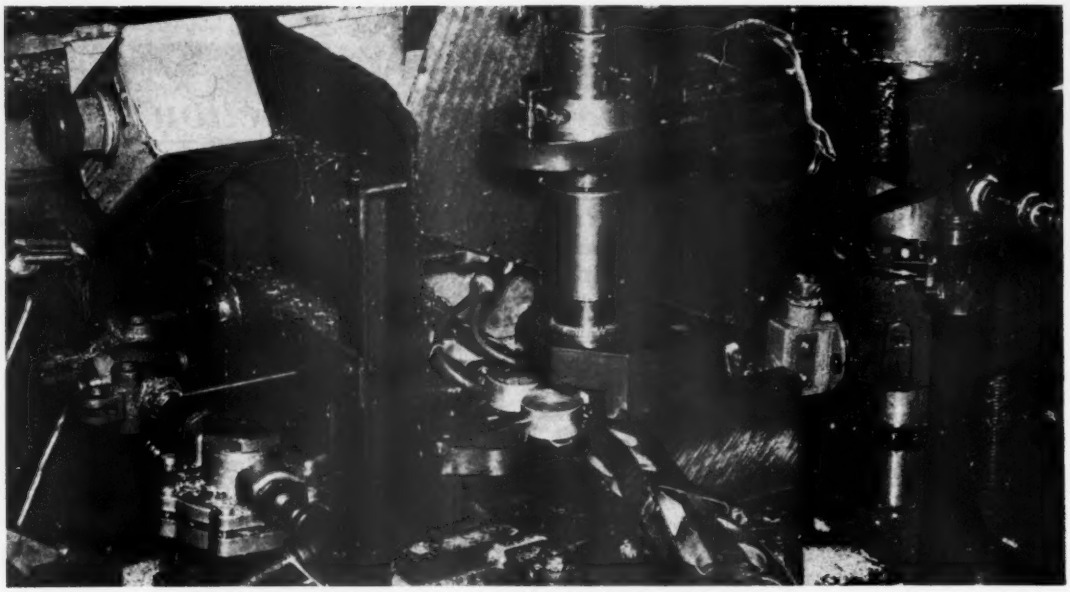


Fig. 2. A solid carbide tap on this job, tapping of high-silicon aluminum alloy die castings, has jumped production by 200%.

1. **Less sharpening and setup time.** In changing either h.s.s. or carbide tools, ½ hr is required for sharpening and ½ hr for removal and setup. On the basis of 45,000 castings, the plant is saving —

45,000 ÷ 1500 x 1 hr = 30 hrs.

This means

30 x $4.50 = $135.00 savings.

Additionally, the carbide tap is producing for the 15 hrs that would otherwise be required for tap removal and setup.

2. **Less inspection required.** With h.s.s. taps, it was necessary to inspect 100%. With the carbide tap, on which wear is negligible, high quality and high production is maintained with only 5% inspection. This saving alone would compensate for the higher tap costs by the end of the first production day.

3. **Increased cutting speeds.** The Barber plant found that the maximum cutting speed for h.s.s. taps is 130-140 sfpm. With carbide, castings are tapped at 400 sfpm. This results in 200% greater production, finer finish, and an over-all improvement in quality. Furthermore, with fewer shut-downs for sharpening and, since loading and clamping are done manually, the operator is able to develop a swing or rhythm with the machine . . . resulting in another 10-15% production increase. With a setup admittedly not ideal, and machine conditions not the best for carbide, this plant is obtaining 850 pcs/hr with a standard of 600 pcs/hr.

An associated plant in the United States, machining the same part, has designed a fully automatic machine and, by using carbide taps, is obtaining over 2000 pcs/hr plus a higher tap life.

Other Experiences with Carbide Taps

In tapping sintered bronze (5-40 N.C. 2B. x .3125 Min. full thread), the International Business Machines Corp. at Endicott, New York, reports that under ideal machining conditions 70,000 holes had been produced with **one** carbide tap, which was sharpened about five times. The average for a 3-yr period was actually 8,132 holes **per tap**, including all breakage. This compared very favorably with a h.s.s., 2-flute, spiral point Comm. Ground Tap which tapped 87 holes, and the same type of tap given a "double surface treatment" by IBM which tapped 244 holes before wearing undersize. This job is run on a special Bodine.

Another plant, tapping 1⅛-24 thread 1¾" deep in a die cast fuse body of 9% silicon 4% copper aluminum alloy, was experiencing tightness in the bottom of the hole when using h.s.s. taps. Using a carbide tap, 150,000 perfect pieces were obtained with three regrinds where they had been able to get only 500 pcs/grind with h.s.s. taps.

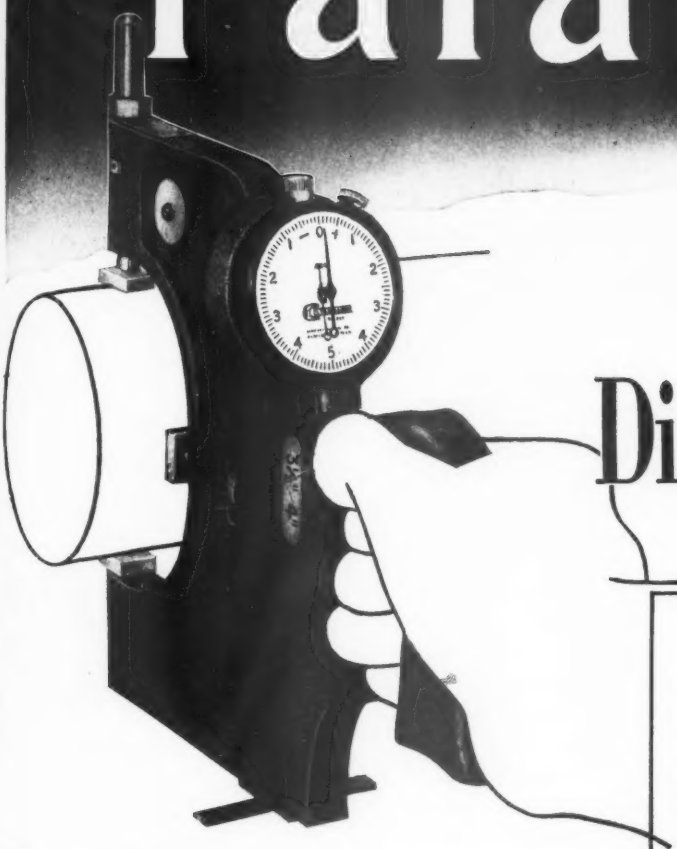
Still another plant, using a .650-20 carbide tap on a Class 3 fit in similar material, got as much as 200,000 pcs/grind as compared with the 2,400 pcs/grind formerly experienced with h.s.s. taps.

STANDARD

Paralloc

"L" Type Dial Snap Gage

PATENTED



RANGE OF SIZES
14″ down to 0″

HERE is a modern, heavy-duty dial snap gage, light in weight, rugged in construction, designed for the toughest of long-run jobs.

The "L" Type utilizes Standard's Paralloc pin locking mechanism, which accurately maintains the parallelism of the anvil faces throughout the range of adjustment to a degree heretofore not available in this type of gage.

Eight sizes cover from 0 to 4 inches, each having ½″ range of adjustment. Above 4 and up to 14 inches, each size has 1-inch range. Anvils are faced with tungsten carbide, and backstops are of nylon (except 0″ - ½″). User may choose from a variety of indicator sizes and graduations. Retracting levers and tolerance hands are also available.

Write for complete information.

STANDARD GAGE COMPANY, INC.

POUGHKEEPSIE, N. Y., U. S. A.

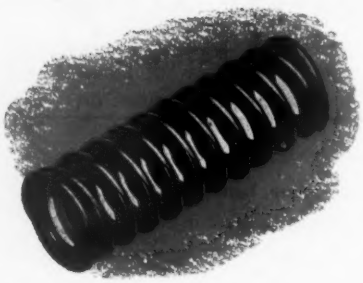
CIRCLE INFORM-A-GRAM KEY NO. 791

We asked hundreds of tool and die makers...

"What's wrong with the die springs you now use?"

Their answers sparked DIECO's metallurgical and design research...led to a complete new line that

out-performs others up to 3 to 1

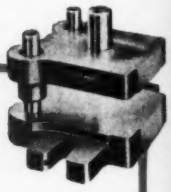


Working with leading spring specialists, Dieco engineers developed a complete new line of die springs which have licked the toughest spring problems.

Special steels were developed... special methods for treating them ...even special packaging methods to eliminate "growth" in transit.

Out of this field research and development came a line of more than 500 standard-size springs, in three distinct pressure classifications: Medium, Medium-High and High. For the first time, it became possible to "fit" the spring to the job at hand, to pick the precise pressure required for a given die action.

Now, satisfied users report that Dieco springs virtually eliminate downtime and wasted man hours due to die spring failure. If you have a tricky spring problem tying up your pressroom, call your local Dieco representative. He will be glad to help you pick the proper spring for the job. And to put an end to spring problems before they start... specify DIECO die sets and die springs.



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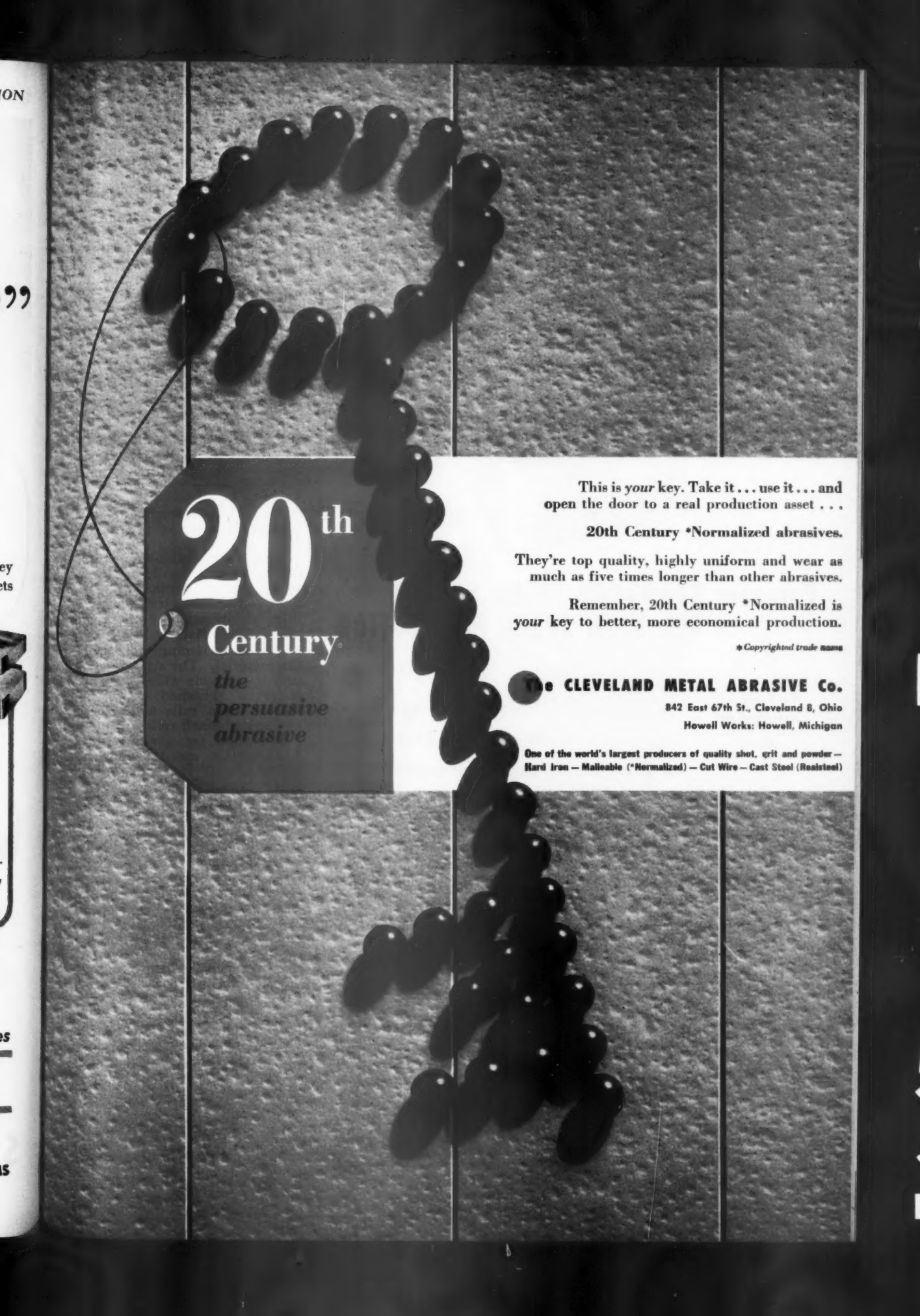
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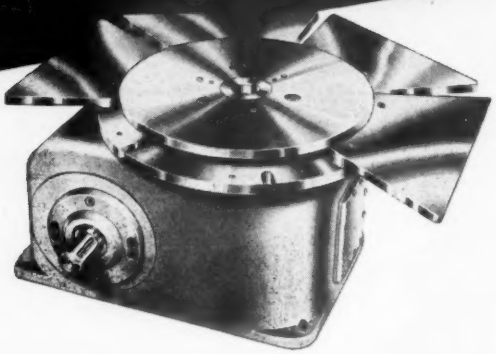
One of the world's largest producers of quality shot, grit and powder — Hard Iron — Malleable (*Normalized) — Cut Wire — Cast Steel (Reisteel)

STANDARDIZED AUTOMATION!



Ferguson STANDARD INDEX TABLES FOR HIGH SPEED PRODUCTION

The Ferguson INTERMITTOR offers

★ Over 150 Standard Models
★ Ease of Installation and Tooling
★ 30,000 Precision Pieces Per Hour
★ Lower Maintenance Requirements

Cut production costs with the new FERGUSON Intermittor, the standard index table that features *high speeds* with *smoothness* of operation; extreme *precision* with no shock-causing auxiliary locking or locating mechanisms; up to 20,000 hours operation with *no maintenance* and complete drive renewal merely by replacing inexpensive ball bearings.

The Intermittor gives you complete choice of profitable work time with a minimum of "wasted" rest during the cycle because movement time may vary from 25% to 75% of the total cycle time. You get more pieces per hour . . . at less cost per piece.

SEND FOR COMPLETE CATALOG #300

SEE THE INTERMITTOR at the ASTE SHOW
Booth #973 • Mar. 14-18
Los Angeles, Calif.

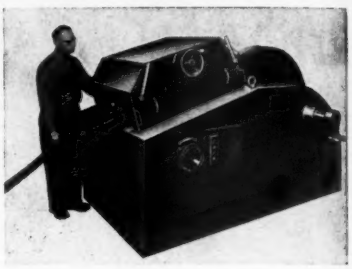
Manufacturers of the Ferguson Trans-o-Mator, Ferguson Roller Gear Drives, Dial Feed Index Tables, Roll Feeds for Presses, Special Cams, Special Purpose Machinery.

ferguson
FERGUSON MACHINE & TOOL CO., INC.
ROLLER GEAR DIVISION, DEPT. HI-3 P. O. BOX 191, ST. LOUIS 21, MO.

CIRCLE INFORM-A-GRAM KEY NO. 821

BRANDES MARKETS COIL CRADLE - STRAIGHTENER

A complete line of combination Coil Cradle and Straightening Machines for use with stamping presses and forming machines is being introduced by The Brandes Press Co., Cleveland manufacturer of automatic stamping presses for progressive dies.



Models are available to handle coil weights from 2,000 lbs to 10,000 lbs in widths from 8" to 24". The cradle is of conveyor type construction with guide plates that rotate with the coil to prevent crimping the edge of the material. The straightening unit is available with either five or seven hardened alloy steel power-driven rolls and one or two sets of pinch rolls.

The units are powered by a 4 to 1 variable speed drive which yields a wide range of feeding speed from 30′ per min to 120′. All electrical controls including a reverse for coil rewinding are built to J.I.C. standards.

The Coil Cradle can be placed close to production machines without interfering with control arms when changing dies because of a short loop control arm between the leveling unit and the press. The micro switches or electrical contact mechanisms controlling the cradle interlock with the press control panel.

For further information, contact Brandes Press Co., 6408 Euclid Avenue., Cleveland 3, Ohio, or—**Circle Inform-A-Gram Key No. D3.**

For Your Future
BUY U. S. SAVINGS BONDS

THIS SLOT COST 30¢—made the "conventional" way on a milling machine.
THIS SLOT COST 15¢—made the logical, obvious way on a DoALL band machine.

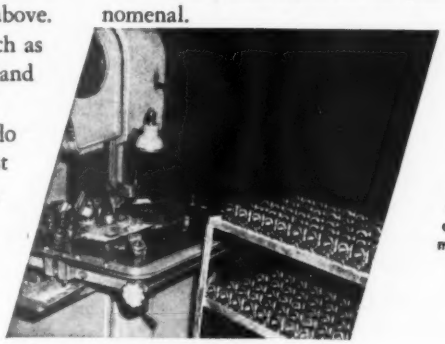
A New Concept For Machining

UNTIL recent years shop men had to use a milling machine to make a slot like that shown above. The old way cost twice as much as the new way with a DoALL Band Machine.

DoALL Band Machines can do many operations at far lower cost than can milling machines, shapers, planers and sometimes even lathes.

The Band Machine removes sections of metal faster than any other machining method. Set-up time is less. Fixtures are simpler. Cutting tool costs are lower.

The Band Machine usually represents from 1/2 to 1/5 the capital investment of other machine tools. It provides true machine tool accuracy and good finishes. New models have variable power feed tables, variable speeds and built-in coolant systems. And, they have the power and rigidity to utilize new DoALL Demon *high speed steel* saw bands. Cutting rates and blade life are phenomenal.



Part to be slotted is placed on simple fixture, automatically fed by power into cutting blade.

All it takes to cut production costs in your shop is to overcome the "conventional" approach. A free demonstration of production band machining at your plant will help you do it. Call your local DoALL Sales-Service Store, or write: *The DoALL Company, Des Plaines, Ill.*

NEW COLOR FILM: "Production Band Machining" now available showing operation of this new machining concept.

DoALL

EDUCATIONAL STUDY WALL CHARTS
Economic Principles
$1.00 each Post paid
Lower quantity prices.

Call Your DoALL Service-Store
DoALL
SAW BANDS
DoALL GRANITE PLATES
Machine Tools • Cutting Tools • Measuring Instruments
Shop Supplies • In Stock
The DoALL Company, Des Plaines, Ill.

Friendly DoALL Stores... (in 40 cities)

Personalized Service...Complete Stocks...Local Delivery

See your local Classified Directory for telephone number

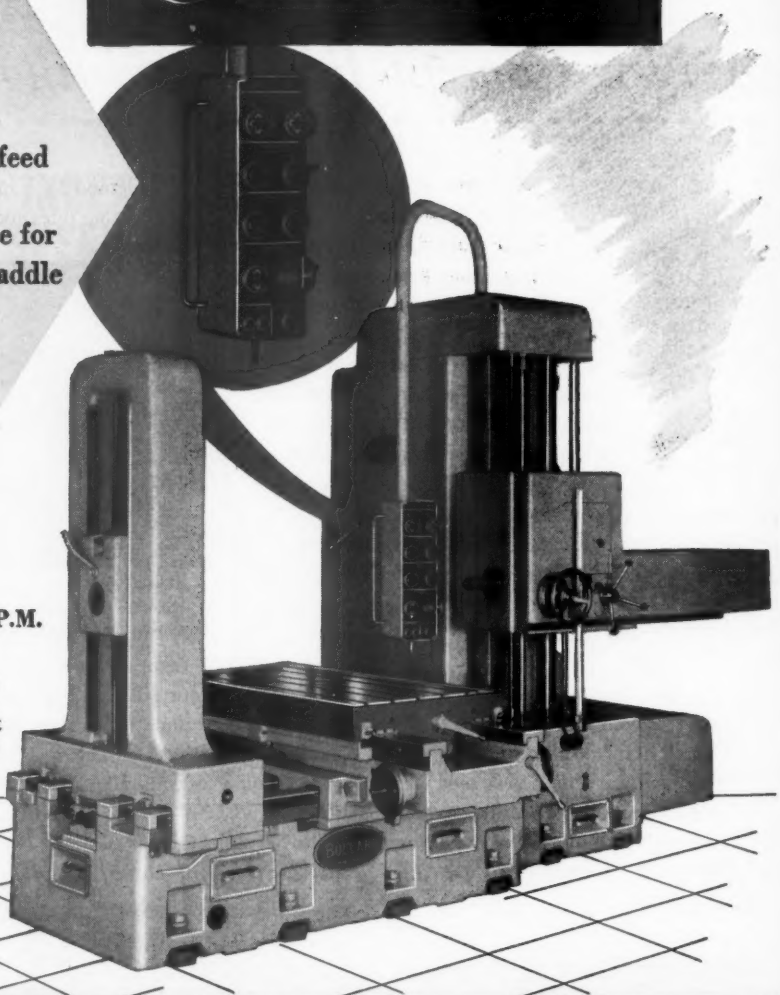
CIRCLE INFORM-A-GRAM KEY NO. 831

NEWEST

SEVENTY FIFTH
1880 BULLARD 1955
ANNIVERSARY

3 II HORIZONTAL BORING MILLING and DRILLING MACHINE

PENDANT CONTROL
Complete **machine control from a movable station for feed and speed selections, directional feed and traverse for Spindle, Head, Table and Saddle**



ADDITIONAL FEATURES

- **Both Screw and Rack Feed to the spindle**
- **Massive 4-Way Bed, Head, Headpost and Rear Post for rigidity**
- **Spindle Speed up to 2000 R.P.M.**
- **Replaceable Ways, chrome hardened, on Bed and Saddle**
- **Optical measuring equipment for head and table (optional)**

FOR FULL INFORMATION CALL YOUR NEAREST BULLARD SALES OFFICE OR DISTRIBUTOR OR WRITE . . .

THE BULLARD COMPANY | BRIDGEPORT 2, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 841

Hats Off! —

● Five metalworking machinery companies were awarded Certificates of Management Excellence for 1954 in the annual survey by the American Institute of Management. Chain Belt Co., Cincinnati Milling Machine Co., Greenfield Tap & Die Corp., Mesta Machine Co., and Monarch Machine Tool Co. were so honored.

● The Cost Accounting Committee of the Metal Treating Institute has received the Institute's first annual Achievement Award for its intensive study of heat treating costing methods and development of a basic method of determining accurate costs in heat treatment. The new system should be of material value in removing many of the uncertainties of cost estimating.

Research —

● A complete gear production development laboratory has been set up at Michigan Tool Co. for research and the development of tooling, manufacturing setups, and practical working designs for new gearings. The lab is a division of Michigan Tool's engineering department which is headed by Clayton Scott, Chief Engineer.

● Seven industrial companies have signed as participators in the nuclear reactor research program at the Armour Research Foundation of Illinois Institute of Technology, Chicago. Aro Equipment Co., Armour & Co., Borg-Warner Corp., Elgin National Watch Co., Illinois Tool Works, Richardson Co., and U. S. Steel Corp., have made initial payments of $20,000 and in return they will share in benefits from the program for three years after the reactor begins operation.

Old Companies, New Names —

● Chicago Belting Co. has consolidated with its two subsidiaries, the Allis Rubber Corp. and the Allis Seal Corp., to form the Chicago-Allis Mfg. Co.

● Welduction Corp. is the new name for Weltronic Induction Heating Corp., Detroit.

● "Production Band Machining" is a good movie for your next engineering society meeting. Technicolor, 16 mm, 30 min., by The DoAll Co., Des Plaines, Ill.

Stockholders of the Gardner-Denver Co. and the Keller Tool Co., have approved a consolidation and Keller Tool is now the Keller Tool Division of Gardner-Denver with operations continued under the former Keller management. Sales activities will be coordinated to provide more efficient compressed air service and a complete line of pneumatic products.

◆

Western Metal Specialty Co., Milwaukee, has purchased the Crippen Machine & Tool Co., Michigan producer of deep drawn and fabricated fuel tanks.

◆

The former Micro Drill Guide and Engineering Co. of Detroit has been purchased by Jessup Engineering and Development Co., Cincinnati. The new Micro Drill Division is now located in Cincinnati.

◆

The name and certain assets of the T. R. Almond Mfg. Co. of Ashburnham, Mass. have been purchased and moved to metropolitan Cleveland. The new company will continue producing drill chucks and medium duty 3-jaw geared scroll and independent lathe chucks. Full production is expected by this month, according to Donald M. Pattison, President and General Manager.

◆

Brown & Sharpe has sold its hob business to the Barber-Colman Co. The manufacturing equipment is being moved to Barber-Colman's plant in Rockford, where it will augment their present hob manufacturing facilities.

◆

A die cushion and plastic press department has been created at Baker Brothers, Inc., Toledo, Ohio. Norman W. Oberle is General Merchandizing Manager and John Hoenig is Manager of the new department.

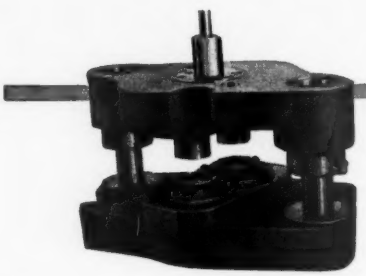
◆

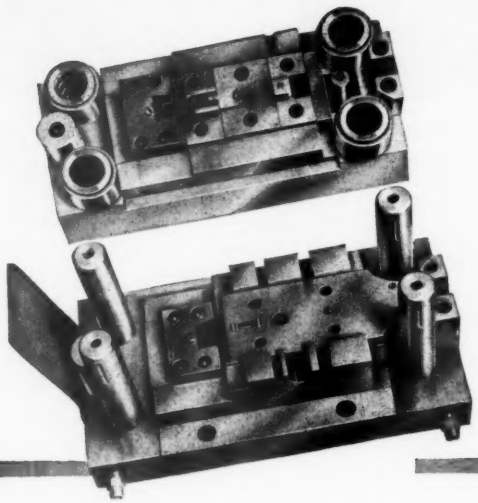
The Gear Grinding Machine Co. has acquired all the assets of Republic Gear Co. and its wholly owned subsidiaries, Detroit Bevel Gear Co. and Almetal Universal Joint Co. The executive management corps of Republic and subsidiaries have been retained.

◆

Staples Tool Co., Cincinnati manufacturer of carbide tipped reamers, counterbores, and end mills has been purchased by National Twist Drill & Tool Co. The new owners are adding carbide tipped twist drills, milling cutters, and similar tools to the Staples line. No significant changes in management or location are contemplated.

The die shown below is used at the Armstrong Cork Company for blanking and drawing screw bottle caps. Equipped with Carboloy cemented carbide, it operates accurately for months on material .006" thick. Steel dies had to be changed once a week.





Production increased 7,000 pieces per hour, tool maintenance cost dropped two thirds, when Carboloy cemented carbide parts were installed on all four stations of this progressive die set (above). It is used in producing SPEED NUTS® at Tinnerman Products, Inc. Stock is SAE 1060, 13/16" wide and .028" thick. Feed and blank length, .632", operating at 750 strokes per minute.

Replacing steel dies with Carboloy® cemented carbide dies, Tinnerman Products, Inc., obtained...

7,000 extra pieces per hour

THE DIES you use may be complex, like this Tinnerman die. Or simple, like the Armstrong Cork Company die.

In either case, you can speed production, and save time and money, by equipping them with Carboloy cemented carbide.

These two case histories merely indicate the wide range of carbide press-die applications, and their benefits – increased production, decreased maintenance downtime, lower die-maintenance costs, better product-quality control. It all adds up to better products, lower costs, greater customer satisfaction.

A Carboloy Sales Engineer will be glad to show you or your diemaker scores of case histories proving these benefits. He'll show you, too, how simple it is to apply and maintain carbide dies. Write, or send coupon.

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

MAIL COUPON TODAY

Carboloy Department of General Electric Company
11111 E. 8 Mile Road, Detroit 32, Michigan

- ☐ Send me Carboloy Die Engineering Manual D-124
- ☐ Send complete details on Carboloy Training School
- ☐ Have a Carboloy Field Engineer call at my plant

Name_____ Title_____

Company_____

Address_____

City_____ Zone_____ State_____

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY

MANUFACTURERS OF CEMENTED CARBIDES, PERMANENT MAGNETS, THERMISTORS, HEVIMET, AND VACUUM-MELTED METALS.

Carboloy Created-Metals for Industrial Progress

CIRCLE INFORM-A-GRAM KEY NO. 861

No Dis-Assembly With Portable Drill Press

The time and money saving Sun All-Angle Portable Drill Press is moved right to the job for drilling and tapping operations, eliminating the need to dis-

assemble large and heavy workpieces, as well as expensive hand drilling and tapping. Combining all the advantages of the conventional fixed radial drill with those of the portable, it will drill and tap from practically any location with machine spindle in almost any position.

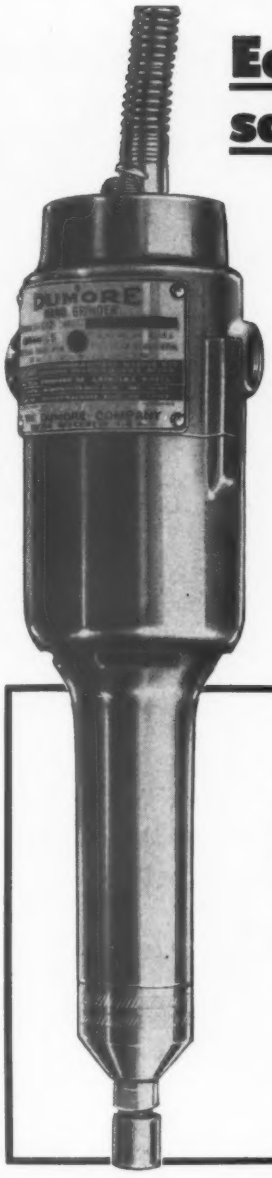
The Sun Portable will drill 14½" to 38" from its column; the head rotates 360° from vertical on a graduated swivel and the drill head rotates 360° on the column. It has four speeds — from 185 rpm to 600 rpm, with a four sec average speed change.

Drilling capacity is 1¼", tapping capacity is ⅝", and spindle drilling depth is 5".

Further information may be obtained from Sun Machine & Tool Co., 4803 Bennett Rd., Toledo 12, Ohio, or — **Circle No. D6.**

Production of special tooling this year probably will equal 1954, predicts George S. Eaton, Executive Secretary of the National Tool and Die Manufacturers Association. Various measuring sticks, Mr. Eaton cautions however, indicate business in the industry could swing either way, increasing or possibly dropping off 10%.

"The renewed activity in letting defense contracts will naturally result in an increased amount of tooling," Eaton said. "Then, too, no letup appears in sight in the struggle among the manufacturers of civilian hard goods for the customer's dollar."



Earn more and save more with new Dumore

35,000 RPM

SERIES 35

PRECISION

HANDGRINDER

. . . for use with tungsten carbide mills, high-speed cutters, mounted wheels and points, abrasive bands, etc.

- **Voltage** — 115V or 230V AC-DC
- **Current** — 3.0 amps
- **Horsepower** — ¼
- **Speed, no load** — 35,000 rpm
- **Duty cycle** — continuous
- **Bearings** — 3 sealed, micro-precision ball
- **Winding connection** — series
- **Ventilation** — internal fan
- **Temperature rise** — 40° C
- **Finish** — grey
- **Weight** — 3 lbs., 3 oz. with cord 2 lbs., 11 oz. without cord
- **Length** — incl. chuck 10¾"
- **Small dia.** — 1⅝"
- **Body dia.** — 2⅛"

THIS "midget miller" offers you an economical solution to a host of grinding, milling, finishing and polishing jobs on materials ranging from wood to hard alloy steel. Powered by a ¼ hp *continuous-duty-rated* Universal motor, it's available for 115V or 230V DC or AC, 0-60 cycle operation.

Three micro-precision bearings seated in steel inserts cast into the grinder housing, assure lasting accuracy on close tolerance work. ⅛" or ¼" collet chucks available.

For complete details, see your Industrial Distributor, or write —

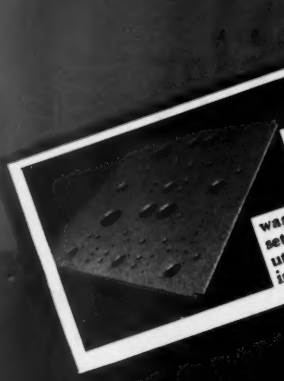
Builders of precision line of Grinders, Automatic Drill Heads, Tool Post Grinders, Drill Grinders, Light Drilling Equipment, Flexible Shaft Tools, Hand Grinders, Fractional hp Motors and Gear Motors.

DUMORE PRECISION TOOLS

1313 Seventeenth Street • Racine, Wisconsin

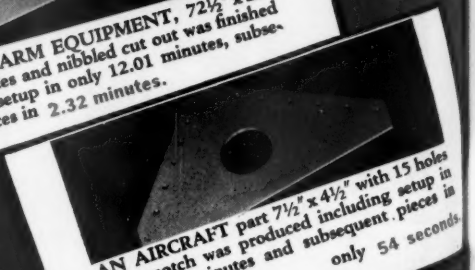
CIRCLE INFORM-A-GRAM KEY NO. 871

Check these AMAZING WALES Fabricator Time Studies



ELECTRONIC CHASSIS 12½" x 11½", with 118 holes and 4 notches was completed including setup in only 32.45 minutes and subsequent pieces in 6.44 minutes.

A part of FARM EQUIPMENT, 72½" x 22" with 32 holes and nibbled cut out was finished including setup in only 12.01 minutes, subsequent pieces in 2.32 minutes.



AN AIRCRAFT part 7½" x 4½" with 15 holes and 1 notch was produced including setup in only 3.52 minutes and subsequent pieces in only 54 seconds.

Part of an ELECTRIC REFRIGERATOR 39⅞" x 8½" with 10 holes and 4 notches was fabricated including setup in only 5.61 minutes and subsequent pieces in only 37 seconds.

● How long would it take you to make a part similar to those shown above?

The difference between your production times and these typical astounding time studies is WALES Fabricators... *the only machine of its kind.*

Designed for rapid interchangeability of punch and die sizes for hole punching, notching and nibbling operations, Wales Fabricators permit working direct from blueprints or operation sheets... *no templates required.*

It's too big a story to tell here so write today for fully illustrated, functionally colored Catalog 10-AA.

WALES-STRIPPIT CORPORATION

George F. Wales, *Chairman*

655 Payne Ave., North Tonawanda, N. Y.

(Between Buffalo and Niagara Falls)

Specialists in Punching and Notching Equipment

SEE WALES EQUIPMENT IN BOOTH 1027 AT THE ASTE WESTERN INDUSTRIAL EXPOSITION IN LOS ANGELES, MARCH 14-18

GORTON PRESENTS A *Winner!*

NEW GORTON 3-48 VERTICAL MILL

Check Your Requirements and These Features

1. 76" table with 48" table travel.
2. Extended saddle with hardened inserts.
3. Fullwidth knee with 24½" bearing spread.
4. Square lock bearing guides.
5. 10 H.P. Spindle motor — drives spindle only.
6. 36 spindle speeds from 25 to 2,000 R.P.M.
7. 3 H.P. motor for table, saddle and knee.
8. Mechanical and electrical overload protection.
9. Interchangeable Assembly Unit Construction.
10. Removable coolant pan for easy clean-out.
11. Dial-type Horse Power load meter.
12. Spindle drive gear designed to reduce wear.

Tracer-Controlled Pantographs, Duplicators — standard and special . . . Horizontal and Vertical Mills, Swiss-Type Screw Machines, Tool Grinders, Small Tools and Accessories.

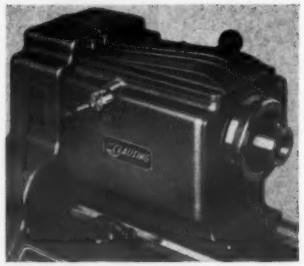
Write for Complete Catalog 1655-1203

GEORGE GORTON MACHINE CO.

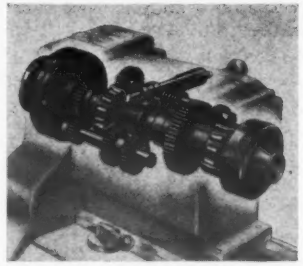
1203 RACINE STREET • RACINE, WISCONSIN, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 891

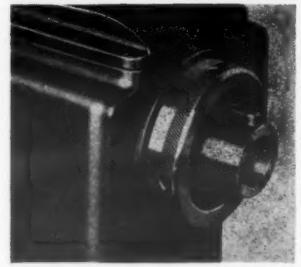
WE CHALLENGE YOU TO MATCH THESE ADVANCED DESIGN FEATURES IN ANY OTHER LATHE OF COMPARABLE SIZE AND PRICE!



☑ Is headstock fully enclosed with gears traveling in oil bath?



☑ Does spindle turn on widely spaced "Zero-Precision" Timken tapered roller bearings?



☑ Is spindle nose tapered key-locked type to prevent chuck's and face plate's coming off when reversed?

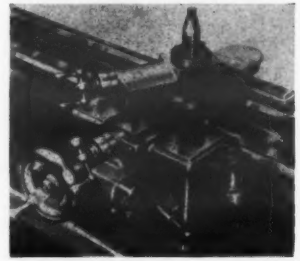
☑ Does it have fully enclosed dual-belt outboard drive with quick, easy belt replacement?

☑ Is Quick-Change box fully enclosed with gears and shafts running in bath of oil?

CLAUSING 6300 HEAVY DUTY 12" LATHE

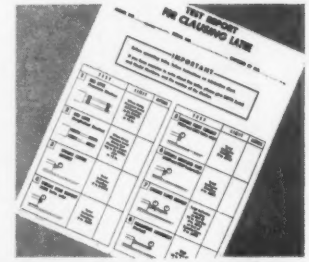
1" COLLET CAPACITY
1 3/8" BORE
24" - 36" - 48" BETWEEN CENTERS

Write for full details



☑ Is automatic apron fully enclosed with entire mechanism running in sealed oil bath?

☑ Does tailstock have No. 3 MT ram with tang socket and permanently attached swing type wrench?



☑ Is each lathe sold with individual test report covering 17 important precision tolerance limits?

ONLY CLAUSING 6300 HAS THEM ALL!

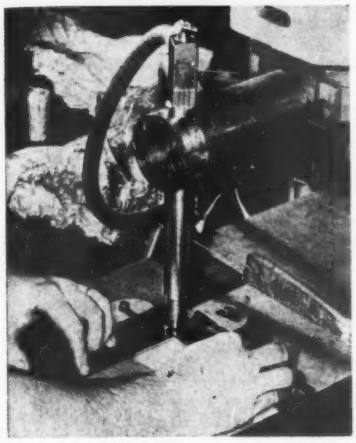
. . . and they're standard equipment . . . CLAUSING costs no more!

CLAUSING DIVISION, Atlas Press Company, 3-115 N. PITCHER STREET, KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 101

APPLICATION OF MAGNETS TO FIXTURE CLAMPING

Custom designers of homes and buildings using metal products, every now and then cause pro-



Photos courtesy Carboloy Dept. of General Elec. Co.

Fig. 1. Two Carboloy permanent magnets enable this welding operator at Hart & Cooley Mfg. Co., to "square up" frame sections on custom jobs three times faster than previously. Here, operator makes first spot weld.

duction dislocations in metal-working operations.

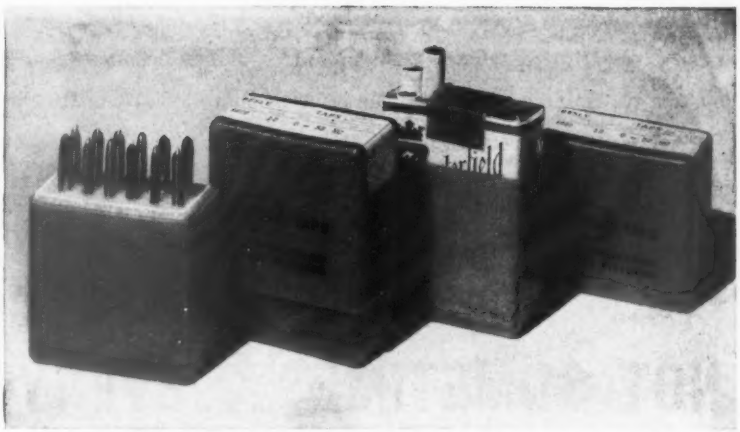
When this happens, it takes a little ingenuity on the part of the manufacturer to meet the demand—especially if he is set up to produce standard items in great volume.

No exception to such an experience is the Hart & Cooley Mfg. Co. The company, which produces warm air registers, grills, and diffusers of all types for heating purposes, is tooled up to produce its products in mass quantities. It uses specially-developed fixtures to clamp and weld automatically the four sides of a register in a single operation at a rapid rate.

Problems crop up when an order is received for a dozen or two custom-designed odd-shaped diffusers.

For a long time Hart & Cooley's production men scratched their heads over the short runs and produced the work the hard way—manually, but today, the procedure is different and so is the output which tripled immediately. Furthermore, the work is less tiresome to the individual involved. A couple of

. . . *Continued on page 172*



New Besly Tap Package not only protects taps from damage, but can also be re-used to hold cigarettes, fish-hooks or other small tools.

MODERN TAP— MODERN PACKAGE

Now, Besly Tap quality is protected by a unique plastic "slip-together" case. It's so resilient it can be dropped or banged about without harming the taps inside. A plastic foam filler holds the taps firmly in position to prevent damage during shipment and storage.

Used to hold taps 0-80 through 5/16" in size, the new case even makes identification easier. It comes in different colors which indicate the type of tap inside. Orange is used for high speed ground thread taps, red for high speed cut thread taps and white for carbon taps. An easy-to-read label on the top gives size, quantity, etc. The case is oil and grease resistant, is easily cleaned and will not deteriorate.

This new case is one more example of the greater quality you get when you order Besly Taps. Their accuracy at all vital points assures better threaded holes, faster cutting and longer life. But don't just take our word for it — see for yourself. Ask for a trial in your own plant — on the type of material you ordinarily tap. This is one trial that can mean big savings for you in machine time and tool costs. Call your Besly Distributor or write:

BESLY-WELLES CORPORATION
128 Dearborn Avenue
Beloit, Wisconsin
Established as Charles H. Besly and Company in 1875
Branch Offices & Warehouses—Chicago, Detroit, Cleveland

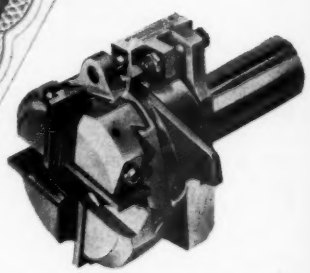
CIRCLE INFORM-A-GRAM KEY NO. 911

Jones & Lamson dies are your best buy . . . whether you need Class III or not. They give you extra savings because of our system of "no approximation" . . . a factor that also applies to Class I and II. So, whatever your requirements, Jones & Lamson's *written* Class III or better Guarantee means -----

IMPORTANT SAVINGS regardless of tolerance requirements — NOT SOMETIMES—EVERY TIME!

TANGENT CHASER TYPES
Stationary and Revolving
Capacities from #4 to 2"

RADIAL CHASER TYPE
Capacities from #8 to 4¼"



FOR BROWN & SHARPE AUTOMATICS and SMALL TURRET LATHES
Capacities from #0 to 1¼"

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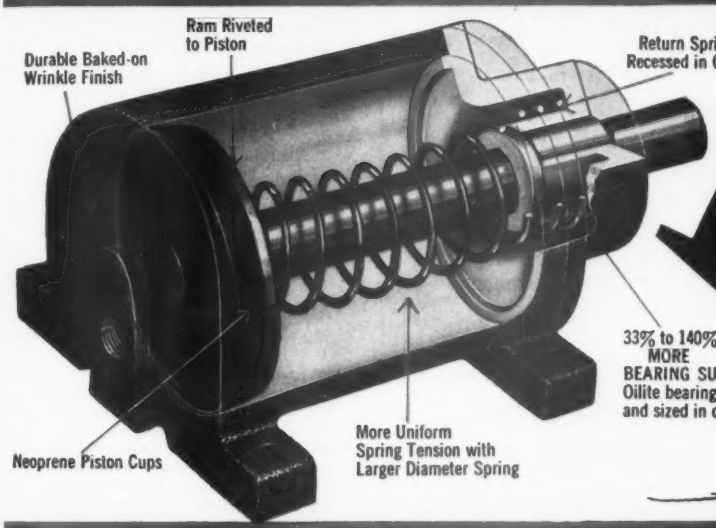
CIRCLE INFORM-A-GRAM KEY NO. 921

Before You Buy ANY AIR CYLINDER-Study this!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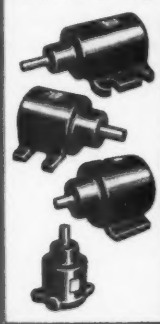
Some of the 26 newly improved single acting Mead Air Clamps now available in many variations of bore, stroke and mounting.



NOW! Durable as Gibraltar

Mead—the originator of *Air Clamp cylinders *and* pathfinder in air power automation—offers a greatly improved series of single-acting *Air Clamps! Study the picture. See just *how* these low-priced cost-cutting beauties are improved. Compare them with others.

Note how longer bearing surface makes ram steadier for accurate work; how Oilite ram bearings now reduce wear, friction and are *replaceable*; how large diameter piston return spring assures longer wear. Surfaces (where required) are now machined. Tolerance—necessary to jig and fixture work—is maintained. All single-acting "Meads" bear the *quality-guaranteed label*.

Our improved new *Air Clamps also *reduce* air consumption and cut your costs of feeding, holding, ejecting finished pieces *sharply*. They're in stock at your nearest Mead Man for *immediate* delivery. Specify Air Clamps now for money-saving automatic production.

Write to Factory or Nearest Mead Representative for Bulletin HA-35

See Alphabetical Index Thomas' Register for nearest Mead Man Address or Phone Number

MEAD Air-Clamp

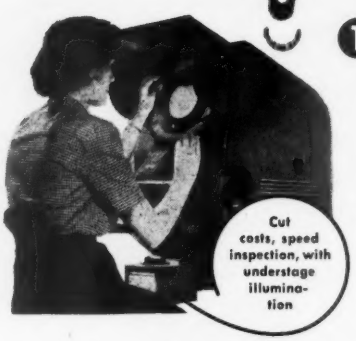
*Air Cylinder

MEAD SPECIALTIES COMPANY, DEPT. HA-35, 4114 N. KNOX, CHICAGO 41

Pathfinder in AIR POWER AUTOMATION

CIRCLE INFORM-A-GRAM KEY NO. 931

3 EASY WAYS to boost production of precision parts



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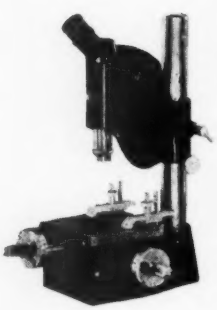
2 Bausch & Lomb CONTOUR MEASURING PROJECTOR

Quickly, easily shows sharp silhouettes or detailed surface views on 18" screen . . . for inspection, comparison, or highest precision measurements. Linear readings to .0001"; angular, to 1 minute of arc.



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BAUSCH & LOMB SINCE 1853

Quality Control INSTRUMENTS

CIRCLE INFORM-A-GRAM KEY NO. 941

THREE SURFACES BROACHED IN ONE MACHINING CYCLE

Broaching three different surfaces on a part in three separate planes during one complete machining cycle not only requires an extremely versatile broaching machine, but necessitates some unusual fixture and tool design. Producers of this particular part — a large automobile manufac-

Fig. 1. Forging to the left is the transmission lever before broaching the two opposite sides of the boss and the V-shaped slot. A completed lever is shown to the right. A Colonial Broach Dual-Ram, 10-ton, 54" stroke machine is used.

turer — requested the Colonial Broach Company, to design the job for the reasons that Colonial builds, as a standard model, a broaching machine that is both versatile enough and possesses the high output requirements needed, and they specialize in "unified broaching" service for developing and adapting to one another all three phases of a complete broaching setup — the machine, fixtures, and tool.

The broached part, in this case, is a transmission reverse band lever, Figure 1. The surfaces to be broached include the opposite sides of the lever boss, and an external V-shaped slot parallel to the axis of the same boss. The designers decided to straddle-broach both sides of the boss in one pass, and broach the 55° V-slot with a separate pass. The Colonial Dual Ram, Model RT-10-54 was selected for this high production setup.

The critical part of the machining job involved locating the lever boss in its fixture so that the straddle-type broach would remove the same amount of material from both ends. Since the geometry of the part did not permit locating anywhere else on the part, except at the faces to be

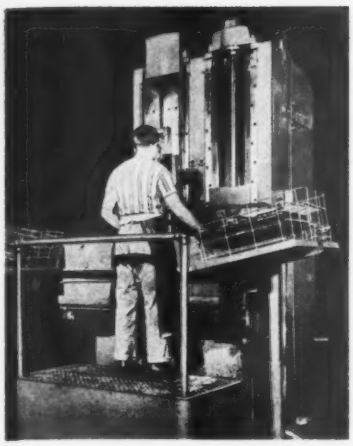

Fig. 2. Colonial Broach production setup for broaching three surfaces of a transmission reverse band lever. Production rate is 160 parts per hour, allowing 9 sec. to load and unload each ram of the dual-ram machine.

broached, the locating device or reference points had to be removable to allow the double-faced broach to straddle the boss during the cutting stroke. To overcome this problem a fixture was developed that combined hydraulic clamping and automatic locating "fingers" that pivoted into and out of position with the shuttle motion of the broaching machine's work platens.

The production cycle sequence of operations consists of the operator placing the lever between the locating "fingers" for the straddle-broaching operation on the left ram and then clamping the part in place hydraulically. Next, the work platen with the fixture moves under the ram and the locating "fingers" are automatically drawn back from the part. At the same time, the right-hand platen shuttles back into loading position. The left-hand ram completes its broaching stroke and the one on the right moves into broaching position. A part is placed in the right-hand fixture and hydraulically clamped in place for broaching the V-slot. The right-hand platen shuttles into broaching position, and the V-slot is broached as the left-hand ram positions itself for the next cycle.

This combination of machine, tools and fixtures completes one part in one machine cycle. The straddle-broached faces are 1⅜" apart with an allowable tolerance of plus or minus .005" across this length. Production rate for this part is 160 parts per hour.

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to lower production costs

Darwin

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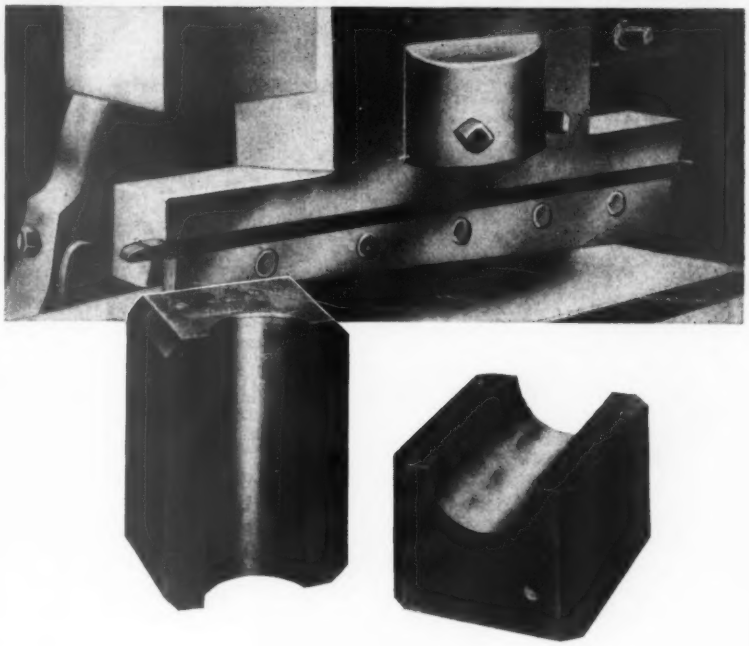
TOOL STEEL



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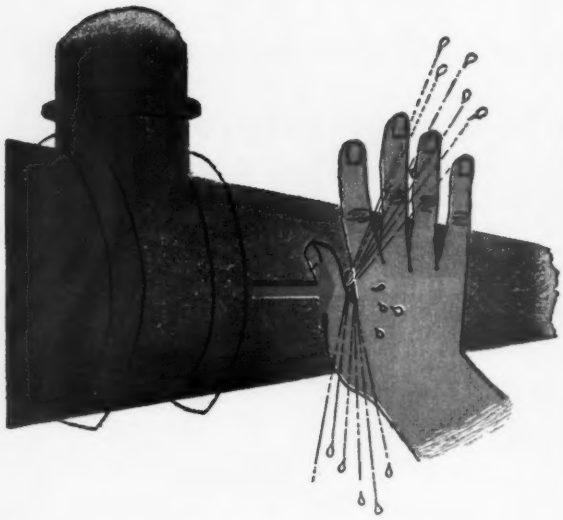
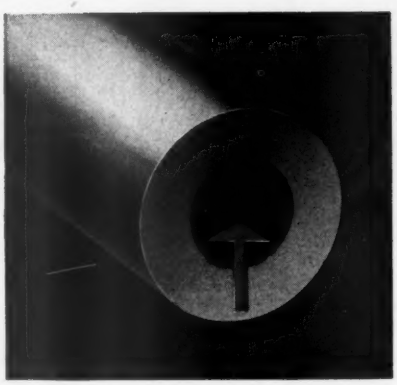


a hole here means trouble...



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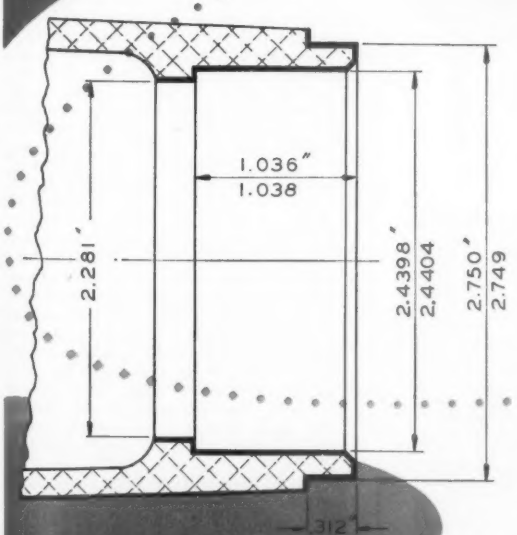


SURFACES MACHINED ARE INDICATED BY HEAVY LINES

Illustration shows typical example of cluster tooling using standard Microbore units for machining seven surfaces on a main bearing housing at one pass. Each tool is independently adjusted by proven micrometer vernier principle and precise limits of accuracy are maintained on production runs.

DEVLIEG MICROBORE COMPANY
2720 West Fourteen Mile Rd. • Royal Oak, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 971

PLANT EXPANSION PROVIDES UNUSUAL PLATING SERVICE

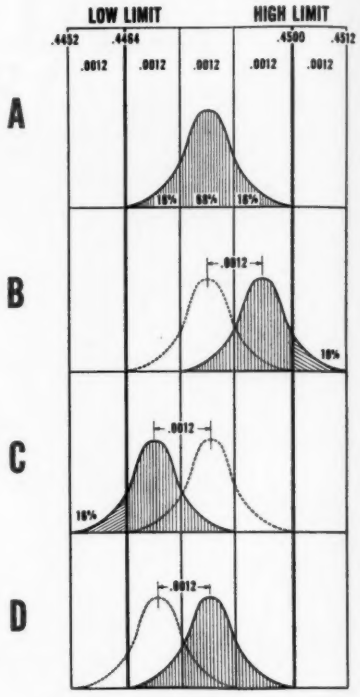
Opening its recently completed million-dollar precision plating plant has given the Standard Pressed Steel Co. facilities for accepting plating work from outside firms.

SPS is a pioneer manufacturer of socket-head screws, so that the new plating plant was built primarily to electroplate and surface-treat SPS products. But with the excess capacity engineered into its nine separate plating lines, the company decided to make available its facilities for producing precision, close-tolerance work, for which it is geared, to those firms requiring precision plating.

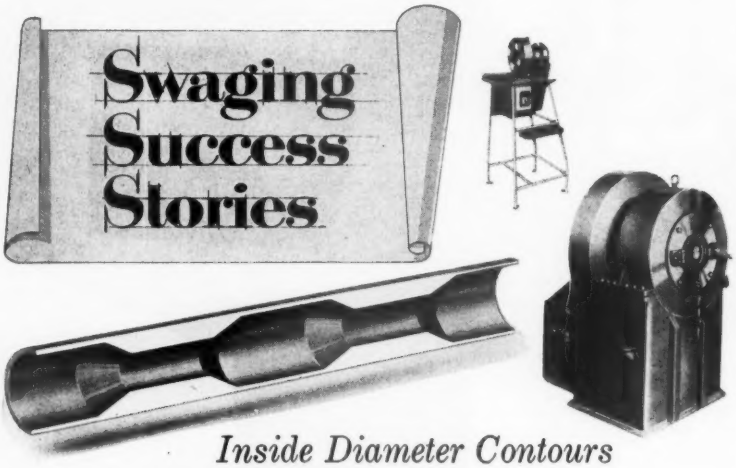
The plating plant, part of a $10-million expansion program, which doubled the floor space of the 50-year-old company, has two of the largest small-parts plating lines in the country, one a 60′ automatic barrel line and the other a 70′ giant on which pieces are plated on racks.

These two machines, controlled through automatic instrumentation, are a symbol of a trend at SPS to automation.

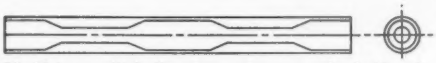
A 110′ long automatic heat-treat line in the hardening department is capable of handling



In the SPS booklet "Precision Plating, a Product and a Service", it is repeatedly stressed that threaded fasteners must be precisely undersize before plating if they are to be exactly within tolerance limits after plating. Helping to illustrate the point in the book are these curves — normal distribution curves reflecting good manufacturing procedures. The first curve (A) shows that in a given lot of screws with permitted pitch diameter range from 0.4464" to 0.4500" (a tolerance span of 0.0036"), 68% will fall within the middle third (0.0012") of the span. 16% will be in the low third and 16% in the high third. Now suppose the screws are plated with a 0.0003" thickness of metal. The pitch diameter will increase four times the thickness of the plating, or 0.0012" (the book explains why). Curve B shows what happens when the pitch diameter is thus increased. 16% of the lot becomes oversize — and cannot be used. But suppose the screws are prepared properly for plating — by lowering the tolerance span limits by the 0.0012" that the plating will add to the pitch diameter. Curve C shows 16% of the screws will then be undersize. But when the lot is plated, as Curve D demonstrates, all the screws will fall within the tolerance.

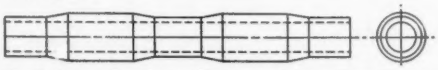


Inside Diameter Contours
. . . Easily Produced by Swaging

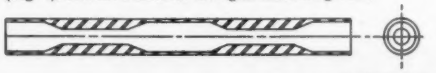


Machining multiple-diameter contours on the inside of cylindrical pieces (Fig. 1) is a difficult, time-consuming job.

Torrington's Swager experts start with tube of larger OD (Fig. 2) and machine the blanks to predetermined outside shape (Fig. 3).



Simply by swaging the outside to a straight, uniform diameter, the intricate contours are transferred to the inside (Fig. 4). Result: a sizeable saving in machining costs.



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Swaging work hardens metal—gives it added strength, better finish and resiliency, dimensional accuracy.

Swaging is fast—can be done by unskilled workers to produce more pieces at lower cost.

Write for our informative booklet on Swaging that gives detailed descriptions of Torrington Rotary Swagers. It may show you how to achieve new savings in your own plant.

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TORRINGTON ROTARY SWAGING MACHINES

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threaded fasteners with a jeweler's precision. It heat treats up to 50,000 screws an hour.

Precision plating thicknesses are maintained by quality-control techniques at every step in the operation of the plating cycle. Thickness is exactly checked by magnetic instruments and by microscopic examination.

In a 32-page, picture-and-text booklet, SPS describes its plating facilities and discusses some of the technical aspects of plating. A point emphasized graphically in the booklet is that the diameter of a round piece is increased by twice the plating thickness and that the pitch diameter of a thread is increased four times the plating thickness.

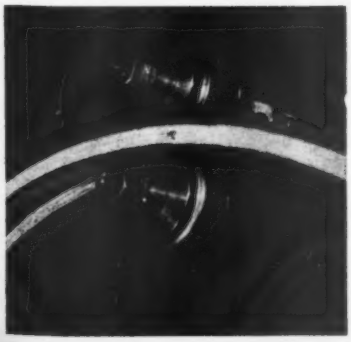
The booklet repeatedly stresses the importance of having products exactly undersize before plating in order to have them within tolerances after plating. The series of curves shown is a guide as to how much undersize a given lot of screws would have to be to finish up exactly right.

Titanium Rings

A method of cold-forming titanium sheets to produce curve cylindrical shell beads without cracking has been developed by Chance Vought Aircraft, Inc., of Dallas, Texas.

Patent application has been made on the process used to bead the difficult-to-work metal. The need for such a process arose when the company needed a stiffer and lighter shroud wrapper around the extremely hot afterburner section of its aircraft jet engines.

A standard "Niagara" machine was adapted to do the work. The metal to be beaded is fed between adjustable tension rotating draw rings. Both external and internal beads were made on 0.012" stainless steel and 0.012" RC-70 titanium. In the former metal they were 0.77" in height and the internal beads 0.57" in depth and 0.25" in width. Springback sides was about 4°. Formability of titanium was less due to its lower % of elongation.



The flow of metal as it is being rolled in the Niagara machine is controlled by two or four adjustable hoops which hold the metal on both sides of the roller wheels. For internal beads only the two inner hoops are used; for external beads both inner and outer clamps are used. The bead is rolled with the grain of the metal normal to the longitudinal circular axis of the bead. When they are across the grain, beads of various shapes and depths can be produced without the danger of cracking.

The method shows promise of being applicable to beading and corrugating of many closed uniform sections other than cylindrical shape. Other forms may be elliptical, kidney-shaped, or irregular. Chance Vought's tool research division is investigating possibilities in those shapes.

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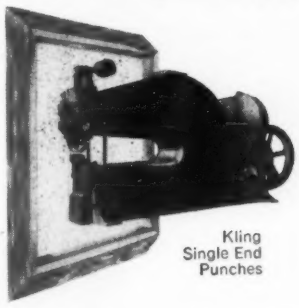
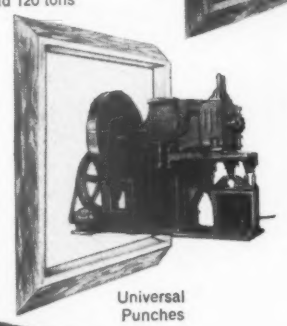


Kling Single End Punches



Universal Punches

Yesterday's machines will not meet today's new conditions. Kling, with more than 60 years' experience, is constantly designing, developing and improving new-type, more advanced metal-working machines to meet these new situations.

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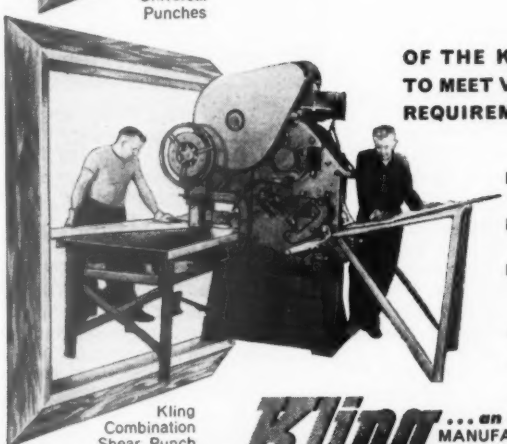

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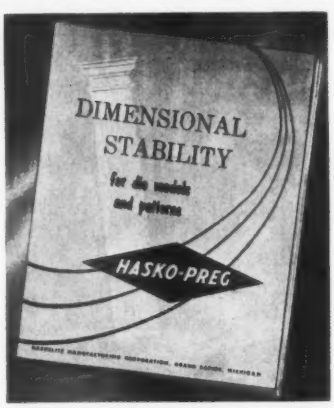
From Bending to Embossing to Testing to . . ., a multitude of manufacturing problems can be solved with the Denison Hydraulic "Multipress." A valuable new catalog contains actual photos of the Multipress in action on the production lines of various plants — producing doorlocks, bending corrugated metal, and drawing heads for pen clips, for instance. Detailed descriptions of operations possible on the press are also included. The Catalog (No. 120-C) is available from The Denison Engineering Co., Columbus 16, Ohio, and should prove a valuable ideasource for production and planning men. For simplified ordering, get your copy by **Circling Inform-A-Gram No. C1.**

"Titanium, New Member of the Family of Metals" presents up-to-date information on the fabrication of unalloyed titanium tubing by the first company to successfully cold draw the comparatively new and very promising metal, Superior Tube Co. Because titanium reacts readily with various gases at elevated temperatures, the section of the booklet describing how Superior solved its own problems of heat treating (for annealing between draws) and welding (in the production of "Weldrawn" tubing) is of particular interest and value to fabricators. Another section on corrosion resistance gives details on titanium's behavior with many of the common reagents. Three forms of the tubing are listed in Bulletin 43—seamless, "Weldrawn," and tube reduced. Get your copy from Superior Tube Co., 1733 Germantown Pike, Norristown, Pa., or — **No. C2.**

Lubrication by Solids. "Properties and Uses of Pure Molybdenum Disulfide As a Lubricant," a 4-page technical paper consisting of excerpts from other papers previously presented before the A.S.L.E., includes a general discussion of the principle of lubrication by solids and a well-illustrated description of the value of molybdenum disulfide in extreme pressure lubrication applications. Featured is a series of industrial applications in which the margin of lubricating superiority of the sulfide compound can be expected to be large. Get your copy from The Alpha Corporation, 65 Harvard Ave., Stamford, Conn., or — **No. C3.**

***STAINLESS TUBING** and pipe fabricating and working data has been published by the Alloy Tube Div'n of The Carpenter Steel Co., Union, N. J. Each of 11 types of fabrication is described separately, with drawings and case history photographs augmenting the information. Twelve helpful hints tell how to design for economical fabrication, and a basic section gives the fabricating characteristics of ferritic, austenitic, and certain specialty steels. Tables provide detailed information on cold bending and coiling both tubing and pipe.*
Circle Inform-A-Gram No. C4.

The Dimensional Stability of "Hasko-Preg," a mahogany veneer product, makes it ideal for die models and patterns. Pertinent technical data on Hasko-Preg is outlined in an illustrated bulletin from Haskelite Mfg. Corp., Grand Rapids, Mich. Featured are facts concerning the improved heat resistance, permanency, stability, and machinability of the veneer.



Circle Inform-A-Gram No. C5.

"The Machining of Ampco Metal" is a well-illustrated, straight-forward reference manual on just that subject. After a brief discussion of general machining properties attention is turned to specific machining practices for various grades of Ampco metal. Additional information on tool design and inspection relative to machining the metal, and machining Ampco-trode weld deposits, rounds-out Bulletin 66a's coverage. Ampco Metal, Inc., Milwaukee 46, Wis.
Circle Inform-A-Gram No. C6.

Fire-Resistant Hydraulic Fluid. A step-by-step list for converting a hydraulic system to Pydraul F-9, Monsanto's fire-resistant industrial hydraulic fluid, as well as detailed information on its properties and past performances is included in a new 20-page booklet. A straight synthetic, the fluid has excellent lubricity, high stability, and non-corrosiveness in addition to fire-resistance, according to test and fluid data presented. Because of its stability and immiscibility with water, Pydraul is readily reclaimed and fluid cost is greatly reduced by using a simple recovery and filter system. Copies of the booklet on Pydraul F-9 are available from Organic Chemicals Div'n, Monsanto Chemical Co., 800 N. 12 St., St. Louis 1, Mo., or —
Circle Inform-A-Gram No. C7.

"Automatic Gaging and Size Control" presents typical examples of high speed gaging with air, specifically with Taft-Peirce "CompAIRator" air gages which can be built directly into machine tools and automatic production lines and can be designed to stop the machine or line whenever parts are produced outside tolerance limits. The booklet describes five CompAIRator gages and sorting machines by The Taft-Peirce Manufacturing Co., Woonsocket, R. I., that are used for many types of rapid production measurements — from simple diameters to complex multi-dimensional checks.
Circle Inform-A-Gram No. C8.

"Selection of Carboloy Grades and Suggested Speeds" points out that proper understanding of the various grades of carbides for cutting metals, plastics, fibers, and rubber results in better finishes, greater accuracy, and longer tool life. Issued as a supplement to Section 3 of the Carboloy Tool Manual GT-191, the new Section 3A includes data for determining efficient cutting speeds for machining steel, cast iron, and nonferrous materials, calculating machine horsepower, determining carbide grades by characteristics, selecting rake and relief angles of carbide tools, and handy reference tables covering speed and grade suggestions for cutting various materials. The supplement also includes latest speed and feed data on the new Grades 350 and 370. Carboloy Dep't of General Electric Co., Detroit 32, Mich., or — **Inform-A-Gram No. C9.**

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to strength and machinability

Products made of brass—like this door knocker—convey a feeling of solid strength . . . the strength of a Titan. Brass has a profound and warm authority that is always in fashion regardless if the product be a forged door knocker or a shiny screw machine part.

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To get the most in metals, call your nearest Titan Office, Distributor or Depot. And send for free booklet "Brass Means Business" describing 1) Titan products and 2) the first full-color, sound motion picture on brass manufacture and uses. It's yours free!

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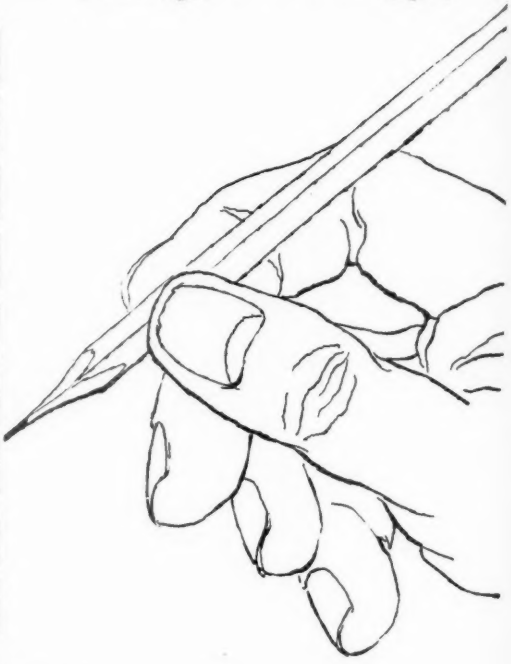


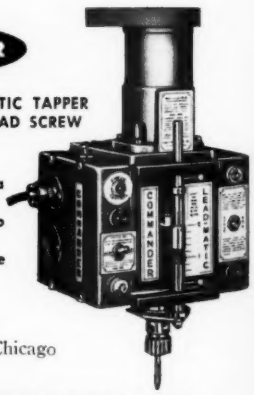
If you've checked *any* of the above—
you need *one* or *both* of these Commander tappers.

Commander TAPPER

- "The tapper that thinks for its operator"
- Handles the range #0 to ¾-16
- Fits any drill press

LEAD-MATIC TAPPER

AUTOMATIC TAPPER WITH LEAD SCREW



- Makes any drill press a precision tapping machine
- Handles the range #0 to ¾-16
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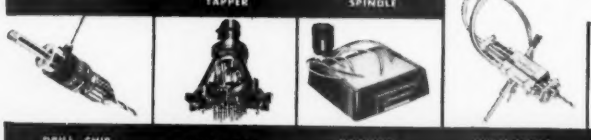

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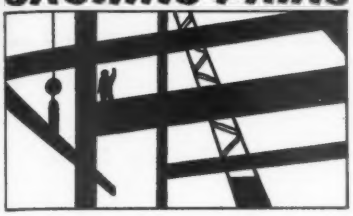
The Commander catalog has complete information on Commander Tappers and many other cost-cutting production tools. Write for it and the name of your nearby Commander Distributors today.

CIRCLE INFORM-A-GRAM KEY NO. 1021

GROWING PAINS



Acme Manufacturing Company of Detroit has expanded plant space by 12,000 sq ft to better handle industry's demands for automated metal finishing equipment. This is the sixth post-war expansion for the company.

◆

A 24,000 sq ft building is under construction in Los Angeles for the **Fairchild Camera and Instrument Corporation.** Primary function of the new plant will be to house the expanded manufacturing facilities of Fairchild's Potentiometer Division.

◆

DeLuxe Saw & Tool Company, manufacturers of "Karbide King" saw blades and cutting tools announces that the company will soon occupy newly constructed production space in High Point, N. C., company headquarters, which will double present facilities and capacity.

◆

Construction of a new $500,000 Shipping and Receiving Building has been started at **The Cleveland Crane & Engineering Co.,** Wickliffe, Ohio, manufacturers of heavy overhead traveling cranes, tramrail systems, power shears, and presses.

◆

A $750,000 plant for the manufacture of roller chains and sprockets will be erected in Colmar, Pa., by **Atlas Chain & Manufacturing Co.,** a division of Prudential Industries, Inc. The plant is scheduled to be completed by the end of this year.

◆

Robertshaw-Fulton Controls Co. will be able to double its production of thermostatic controls and ignition devices for gas heating appliances at its new Grayson Controls Division at Long Beach, Calif. The recently completed $3-million plant has 237,000 sq. ft. of floor space.

◆

An additional 46,000 sq ft building has been acquired by **Huck Manufacturing Company** of Detroit to house expanded production and research equipment. Extensive new automatic machinery has been acquired for the manufacture of Huck Conical Keystone Lock blind rivets, used extensively in aircraft manufacture.

Construction work on a new high-speed cold rolling mill at the Trentwood, Wash., plant of **Kaiser Aluminum & Chemical Corporation** is scheduled for completion this month. Key unit of the new facilities is a 60", four-high rolling mill which will add 18,000 tons of light gauge aluminum sheet to the company's yearly capacity.

◆

Purchase of 157 acres in Sterling Township, north of Detroit, has been made known by **Ford Motor Company,** as the site of a new chassis parts manufacturing plant.

Benchmaster Manufacturing Co., of Gardena, Calif., has announced the opening of a new East Coast office and warehouse in Mt. Vernon, N. Y. Known as the Benchmaster Parts Co., it will supply customers and dealers.

◆

The Carborundum Company has just completed two new warehouses and office buildings in California and has reorganized sales, engineering, and other services in the West into what is now designated the Pacific District. The new buildings total 35,000 sq ft of space.

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which man are you?
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PORTER will produce your punches to your prints—or—with a small change in your design—the SP catalog will save you thousands of dollars.
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CIRCLE INFORM-A-GRAM KEY NO. 1031

MEN YOU SHOULD KNOW

New Plant Manager of Carboloy Department's permanent magnet plant is **Ernest E. George. R. J. Studders** succeeds Mr. George as Manager of Magnetic Products Engineering.

◆

Herbert B. Clark, who has been President and General Manager of Vascoloy-Ramet Corporation has been appointed Executive Vice President of Fansteel Metallurgical Corporation and its subsidiaries, Vascoloy-Ramet, WW Alloys, Inc., and Tantalum Defense Corporation.

Reed-Prentice Corporation, an affiliate of Package Machinery Company has promoted **Lebbeus S. Case** to the position of Production Planning Manager. Mr. Case succeeds **Victor Rosenlund,** who has retired after 47 years with Reed-Prentice.

◆

The Cleveland Crane & Engineering Co. has advanced **Harry Cotesworth** to Chief Engineer of the Development Department and **Kurt R. Weise** to Chief Engineer of the Cleveland Tramrail Division.

The promotion of **E. Hugh Jones** to Operations Manager of the Lima and Fostoria plants is announced by the Ex-Cell-O Corporation.

◆

Appointment of **Joe Zimmer** as Plant Manager of the Wausau Manufacturing Co., a subsidiary of Borg-Warner Corp. at Wausau, Wis., has been announced. He previously was Production Manager of the Ingersoll Products Division of B-W in Kalamazoo, Mich.

◆

William F. Fetzer has been named Sales Manager of the Phillips Corporation of Carnegie, Pa. In his new position Mr. Fetzer will take over the sales duties of Vice President James M. Phillips, who will now devote his full time to the development of new products and markets in keeping with the firm's expansion program.

◆

Bryant Chucking Grinder Co. has announced the appointment of **Paul M. Grobey** as Director of Engineering and Research. Mr. Grobey has served in the Sales and Engineering departments of Bryant since joining the company in 1937. Most recently he was Director of Research.

◆

Two men have been promoted by The Sharon Steel Corporation. **Robert F. Renkin** is now a Research and Development Engineer, and **George D. Myers** has assumed the duties of Superintendent of Coating in addition to those as Superintendent of the Hot Strip Finishing Division, a position he has held since 1950.

◆

William W. Lamb has succeeded **R. W. Devans** as Sales Manager of Precision Metalsmiths, Inc., Cleveland investment casting firm. Mr. Devans is Vice President and Treasurer of the company and is now free to assume other duties.

◆

Appointment of **Harold R. Foss** as Director of the Manufacturing Engineering Office of Ford Motor Company was announced recently by D. J. Davis, Vice President-Manufacturing. Mr. Foss, formerly Assistant Director of Manufacturing Engineering, succeeds Mr. Davis as the Staff Executive directing all production and engineering activities for the company.

◆

Stuart R. Booker of the Federal Screw Works of Detroit and Chelsea, Mich., was elected to the Board of Trustees of the National Screw Machine Products Association last month. Mr. Booker is active in the affairs of the NSMPA Michigan District, and is a member of the national group's Statistics Committee.

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it's the finish that counts!

Roto-Finish maintains exact tolerances on precision parts with no significant dimensional changes. It makes possible a wide range of finishes applicable to parts of almost any size or shape; finishes a variety of materials — at big savings in manpower and costs. Without obligation, send sample unfinished parts to us. Include finished part for guide and your specifications. Roto-Finish will finish parts in its laboratory. You get a complete process report. You are guaranteed results and a finish that counts!

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Originators of the Roto-Finish Process

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CIRCLE INFORM-A-GRAM KEY NO. 1041

MEN YOU SHOULD KNOW

John Berka, newly appointed Assistant to the Director of Executive Services, Management Consultants in Cleveland, will serve as a staff instructor at the Mathematical Programming Workshops given by Executive Services and also as special adviser on programming assignments. He was previously responsible for all mathematical programming studies and installations for the Mueller Brass Company.

◆

Clifford L. Christensen has succeeded **M. L. Richardson,** now retired, as Chief Inspector for the Toledo Division of Dana Corporation.

◆

Thomas W. Johnson has been appointed Director of Engineering of the New York Air Brake Company, in charge of engineering for the company's five divisions: Kinney Manufacturing Co., Aurora Pump Co., Dudco Division, Hydreco Division, and Watertown Division.

◆

Three promotions are listed by the Pratt & Whitney Division of the Niles-Bement-Pond Company. **A. S. Burgoyne** is now Manager of Domestic Gage Sales; **A. F. Miller, Jr.** is Manager of Domestic Cutting Tool and Precision Parts Sales; and **J. B. Wilkie** is Assistant Manager-Cutting Tool and Gage Divisions.

◆

Two sales promotions are announced by The Wilton Tool Mfg. Co., Inc. **Alex J. Vogl,** formerly Sales Manager, has been promoted to the position of Vice President for Sales and **William J. Ferrick** has moved up from Assistant Sales Manager to Sales Manager.

◆

Stockholders of the Harig Manufacturing Corporation have elected **Karl Harig,** former President, to the position of Chairman of the Board. Officers of the die and machine tool product firm are **Herbert Harig,** President and Treasurer; **Theodore Eckert,** Vice President of Manufacturing and Secretary; and **William Thorp,** Vice President of Sales.

◆

The formation of the Delta Welder Corporation in Detroit was recently announced by **Harry E. Day,** President. Formerly Vice President and General Manager of Link Welder Corporation and Chief Engineer of Multi-Hydromatic Welding & Mfg. Co., Mr. Day has had extensive experience in the resistance welding equipment field. Delta Vice President is **Glenn Cashdollar,** also formerly with Link Welder, and **Arthur Zebedee** is Secretary-Treasurer.

The Henry G. Thompson and Son Company, manufacturers of metal cutting saw blades, has announced the appointment of **Frank J. Wandyes** as Plant Superintendent. **M. J. Rabecki,** formerly Plant Superintendent, is now Plant Manager.

◆

Frank P. Joyce has been named Manager of Manufacturing by The Samuel M. Langston Company, Camden, N. J., producer of machinery for the corrugated container industry and paper mills.

◆

E. V. Dowden, Manager of Osborn Manufacturing Company's Brush Division, has been named a Vice President of the company. Mr. Dowden joined Osborn in 1941 and was made Brush Division Manager in 1952.

◆

Wallace E. Anderson has been named General Sales Manager of the Brown & Sharpe Manufacturing Company. Mr. Anderson was Division Superintendent of the company's Precision Tool and Gage Division previous to this appointment.

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STUB LENGTH END MILLS
with flutes shorter than regular
Offer GREATER STRENGTH...*
TWO, THREE AND FOUR FLUTE
MELIN
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...★ Plus an Exclusive... In addition to manufacturing a complete line of End Mills, the Melin Tool Company makes several standard Stub Length Mills exclusive of other tool manufacturers.
The new Melin Tool Catalog No. 54-C lists the specifications on these all inclusive Stub Length Tools... and... they offer greater strength and less breakage. Write for your catalog... today.
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CIRCLE INFORM-A-GRAM KEY NO. 1051

GM Develops New High Temperature Alloy and Aluminum Coating Technique

Two disclosures of extreme interest to the metalworking industries were made by General Motors research personnel before the recent Society of Automotive Engineers midwinter meeting in Detroit.

In a technical report D. K. Hanink, F. J. Webbere and A. L. Boegehold of GM Research Laboratories Division detailed development of GMR-235, a nickel base alloy of relatively available metals capable of withstanding high temperatures of gas turbine engines in jet aircraft.

One of its main advantages is sparing use of strategic materials which would be important in a national emergency. In addition to its nickel base, GMR-235 consists of carbon, manganese, silicon, chromium, iron, molybdenum, aluminum, titanium and boron.

Tests have shown the new alloy superior to all other alloys containing much higher percentages of strategic materials, the report said.

The GM metallurgists explained that one of the main obstacles in making better jet and turbine engines is the metal temperature limit for turbine blades and buckets. These blades are in the path of burning fuel which not only heats them red hot but also vibrates them by blowing past the blade edges.

They also described how the new alloy is made by compounding several metals in a master heat, casting the alloy in the form of shot for ease of handling and blending heats.

The GM report said precise amounts of boron, aluminum and titanium that go into GMR-235 were determined by making experimental alloys of various compositions and subjecting to tests.

Casting technique is important to turbine bucket manufacture, and as a side aspect of the development GM metallurgists made transparent plastic molds. High speed motion pictures of water flowing into these molds disclosed turbulence from poor gate design which, in turn, produced casting flaws.

Improvements resulting from these flow studies not only produced better turbine buckets but also made the testing of batches of GMR-235 much more precise and reliable than before.

To date more than 500 tons of this alloy have been melted and cast into various shapes for gas turbine service.

In flight tests on production aircraft engineers equipped with GMR-235 blades, 12 sets of blades have been run for more than 500 hours, with maximum time exceeding 800 hours.

The new aluminum coating technique was reported by Dr. R. F. Thomson and D. K. Hanink, of General Motors Research Laboratories Division, E. B. Etchells of Chevrolet Motor Division and K. B. Valentine of Pontiac Motor Division.

They explained how the so-called Aldip process has been

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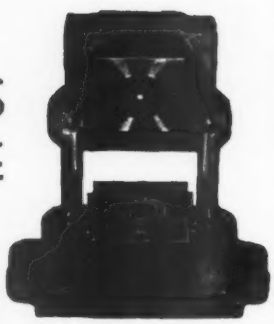
OFFERS YOU THIS SIMPLE, UP-TO-THE MINUTE METHOD



There's no need to make a complete new Die for any type washer or blank. The HOVIS UNIVERSAL WASHER DIES provide a Master Holder and by merely changing 5 SMALL, EASILY REMOVABLE PARTS the new washer or blank is produced . . . Special sets of parts are available for use in Master Washer Units enabling customers to produce irregularly shaped pieces and shallow draws. Multi-Washer Dies are also designed and manufactured.

Made in 5 sizes:
¾"—1½"—2½"—4"—6"

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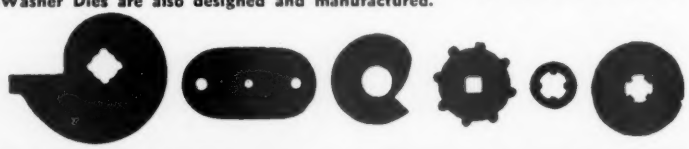

HOVIS SCREWLOCK COMPANY
8100 E. NINE MILE ROAD VAN DYKE, MICHIGAN
Phone: Slocum 7-4800 Suburb of Detroit
CIRCLE INFORM-A-GRAM KEY NO. 1061

applied successfully to automotive engine intake and exhaust valves.

Aldip was developed by GM Research Laboratories to protect steel parts against oxidation and corrosion, especially at high temperatures. It has been used on exhaust manifolds, heat exchangers and turbine engine components with great success.

Use of Aldip on engine poppet valves, however, is the first application to moving parts of an engine.

The report described two general methods for applying an aluminum coating to a steel part.

The original method, especially adapted to coating intricately shaped parts, is to reheat the part in a special patented salt flux and then dip it in molten aluminum. Excess aluminum clinging to the part after the dip is blown, spun or shaken off.

A newer method eliminates the dipping operation. Aluminum is sprayed onto the steel part. Then the part is heated in the flux bath until the aluminum melts. This spray technique makes possible quick, even application of aluminum and is particularly well suited to coating engine valves.

In road tests reported by GM engineers, Aldip valves lasted more than twice as long as uncoated valves of the same steel composition.

By increasing a valve's resistance to high temperature corrosion and oxidation, the Aldip process creates a better valve without increasing use of expensive, critical alloy metals.

The four GM spokesmen said the secret of Aldip's protective ability is the alloy layer formed just beneath the surface. When the steel part comes in contact with molten aluminum, the two metals combine to form an iron-aluminum alloy layer between the underlying steel and the pure aluminum on the surface.

In coating poppet valves, where dimensional tolerances are small and critical, it is essential to coat the steel with a minimum of distortion and dimensional change. This can be done with the GMR-developed method of Aldip coating either by dipping or by spraying.

The GM engineers also pointed out that the Aldip treatment does not increase valve distortion beyond acceptable limits when valves are stress relieved before dipping.

Results of road and dynamometer tests, the GM report said, show conclusively Aldip's merit. For the most part valve tests were conducted under conditions of accelerated failure. (A valve was assumed to have failed if it could not maintain a cylinder pressure of 25 pounds for a 24-hour period.)

In certain truck tests not a single coated valve failed, while four plain valves failed. In tests on 18 cars only three coated exhaust valves and not a single intake valve failed. During the same time 27 exhaust and 13 intake valves — all uncoated — failed.

Dynamometer tests on engines equipped with Aldip and plain valves in alternate cylinders were also run. In each of three tests the poorest Aldip valve was better than the best uncoated valve.

The GM engineers said the aluminum coating technique has progressed far beyond the ex-

. . . Continued on page 131

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SUBLAND
Believing that there is too great a void between standard and special tooling, Mohawk has designed and developed a semi-standard subland tool.
The Mohawk Size-Optional Subland is machined, hardened and placed in a stock bin. This results in a material saving to the customer in set-up costs, reduces delivery time to a fraction of that usually required for special tools, and allows a tremendous reduction in inventory. In ordering these Size-Optional Sublands, the customer is limited only in relation to shank specifications, and partially on overall length requirements. Diameters and step lengths are completely optional to fit the particular application.
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SUBLAND DRILL (2-2)
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CIRCLE INFORM-A-GRAM KEY NO. 1071

YOUR FIRE BRIGADE - - OR DON'T YOU HAVE ONE?

Despite modern plants, excellent alarm systems and scientific fire fighting equipment, fires cost American industry millions of dollars annually. Fires in manufacturing establishments are increasing and such fires today, according to the National Board of Fire Underwriters, account for over half the nation's annual $900,000,000 fire loss, and two or three times this amount in indirect losses, jobs, wages, production and medical costs.

Many plants are subject to fire hazards peculiar to their own operations, but the four leading fire hazards common to most manufacturing operations are spontaneous ignition, smoking and matches, misuse of electricity, and heating defects. Since most fires are the result of human carelessness the need for employee support of fire prevention techniques in the average plant or business is becoming more important. It is equally obvious that the way to prevent little fires from becoming big fires is to extinguish them before they can spread.

This brings up the subject of the plant fire brigade, a volunteer organization, which a growing number of professional fire fighters are coming to regard as the "missing link" in fire prevention. No company is too small to have a fire brigade and a training program which prepares the volunteer members to assemble rapidly and take emergency action without panic. Many companies have invested thousands of dollars in fire prevention and fire fighting equipment, but few employees are trained in its use.

One of the member companies of The Associated Industries of Cleveland, which is contemplating the formation of a volunteer fire brigade, went to The Association's research department recently with some questions regarding this important adjunct to basic plant fire safety. One of these questions concerned the basis on which the average plant fire brigade is organized, volunteer or paid, and another was in regard to outside insurance coverage for the brigade members. If the formation of a plant fire brigade is on your docket for 1955, you may find what 12 of AIC's member companies reported to be of interest and help.

Company 1: Company has a fire brigade which is in charge of a fire marshal. It is set up on a voluntary basis for the hourly paid workers only. There is no outside insurance coverage for the employees involved in the brigade.

Company 2: Fire brigade in this company is supervised by the plant engineer. Both the hourly paid employees and the office employees are volunteers. No additional insurance coverage is maintained for the volunteers.

Company 3: Company has a fire brigade although not fully organized as yet. They have held a couple of fire prevention demonstrations. Chief of the guards is in charge. It is a voluntary arrangement for the hourly employees. Factory workers would also have charge of the offices. No outside insurance coverage for the brigade participants.

Company 4: Fire brigade is under the direction of the safety director. It is on a voluntary basis for hourly employees. No formal plan in the office. There

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WITH GAUGE BLOCK ACCURACY
MAGNA-SINE

ON angular set-ups the Magna-Sine saves hours of set-up time, provides positive accuracy, holds work securely without distortion.

The Magna-Sine is a quality permanent-magnet chuck mounted on precision hardened and lapped hinged plates. A Table of Constants provided, quickly shows the standard gauge blocks to insert between the plates for any angle—single or compound. Set-ups to gauge block accuracy take minutes, not hours! When closed, the Magna-Sine is used as a conventional magnetic chuck. Thousands are in daily use.

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Also producers of special gauges and fixtures

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GRINDING
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AT
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is no outside insurance coverage inasmuch as they consider the combating of fires part of their job.

Company 5: Fire brigade is under the general supervision of the safety department. Each of the 3 shifts has a fire chief, captain, and lieutenant to take charge of operations. Volunteers make up the entire brigade. The hourly employees in the brigade are also responsible for the offices in event of fire. No outside insurance coverage.

Company 6: Fire brigade is maintained among the hourly paid employees only, under supervision of a fire warden who is a maintenance foreman. Members of the unit are on a volunteer basis. No special insurance carried.

Company 7: Fire brigades are organized on a departmental basis. The safety director is in charge of the entire operation. It is a voluntary arrangement among both the hourly and office employees with each department having a captain and lieutenant. No outside insurance coverage.

Company 8: Both hourly and office employees have fire brigades. The plant protection department has charge. Volunteers are used among the hourly paid employees and the office employees. No outside insurance coverage is carried.

Company 9: Fire brigades are maintained in both the office and among the hourly paid employees although loosely organized. The safety director is in charge of the brigade with the individual foreman responsible for their own sections. Voluntary throughout the hourly paid and office employees. No outside insurance coverage.

Company 10: One man in each department among the hourly paid workers is responsible for any minor emergencies while the guard is responsible in case of an all-out fire. The office has no formal plan setup. The entire supervision is in the hands of a safety committee. The setup is voluntary and no outside insurance is carried.

Company 11: Only hourly paid employees have a fire brigade which comes under the general supervision of the safety and health director. The maintenance men are in immediate charge in event of fire. Participants are all volunteers. No outside insurance is carried.

Company 12: Company has a fire brigade which is in charge of the plant protection director. It is a voluntary arrangement with the participants receiving a token $10 at the end of the year. The hourly paid members are also responsible for the offices. No special outside insurance.

ACCURATELY ROUTING TEMPLATE HOLES

Lightening holes in router template blocks are routed within tolerance in one operation by means of a unique router guide in use at TEMCO Aircraft Corporation.

No sanding or filing is required to reach final accuracy, and the only reference mark needed by the router guide is the conventional template pilot hole.

Fly cutters formerly were used to cut holes in template blocks. Cutter slippage, off-center spindles and other irregularities, however, reduced accuracy to the point that hole-cutting required

. . . *Continued on page 124*

PRODUCTION MACHINERY
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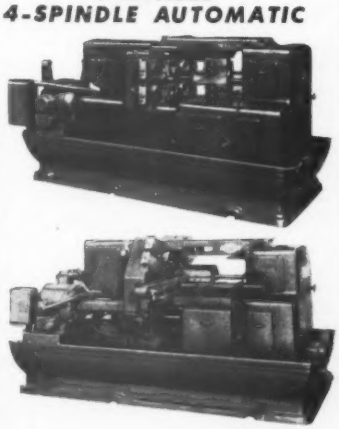
AUTOMATIC BAR MACHINES

INCREASE YOUR PRODUCTION . . .
LOWER YOUR COSTS!

CUT YOUR SET-UP TIME
SPEED-UP DIFFICULT OPERATIONS

GREENLEE 4-SPINDLE AUTOMATIC



GREENLEE 6-SPINDLE AUTOMATICS

SPECIFICATIONS

Rating	1"	1-5/8"	2"
Chuck Capacity, Round	1"	1-5/8"	2"
Chuck Capacity, Hexagon	7/8"	1-13/32"	1-3/4"
Chuck Capacity, Square	3/4"	1-1/8"	1-7/16"
Stock Feed	6-3/16"	8-5/16"	8-5/16"
Turning Length	6"	7-1/2"	7-1/2"
Spindle Speed Range	225 to 2500	105 to 2175	95 to 1935
Feed Range per Spindle Rev.	.0014 to .0218	.0017 to .0388	.0019 to .043
Motor Horsepower	15	20	25
R. P. M.	1800	1800	1800
Floor space:			
Length with Stock Reel	17'-6"	17'-3"	17'-3"
Width	5'-0"	5'-4"	5'-4"
Height	4'-11"	5'-4"	5'-4"
Net Weight in Pounds	14,400	17,940	18,150

GREENLEE 2ND OPERATION AUTOMATIC

Extremely versatile, high-production machines. Parts can be loade semi-automatically or fully automatically. Incorporates the sam basic features . . . inherent production and operating advantages o the standard 6-Spindle Automatics.

Investigate Now . . . Phone Rockford 3-4881

PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
2043 MASON AVENUE
ROCKFORD, ILLINOIS

INDEXING DRILL UNITS INCREASE PRODUCTION 100%

Roller pockets for the bronze retainers of precision radial and thrust roller bearings are machined in one operation at Rollway Bearing Company, on two automatic indexing air-hydraulic drill units. Designed and engineered by Rollway, the new machines drill and ream both radial and thrust retainers, which vary in size from 2″ to 14″ OD and from ¼″ to 1¼″ drill dia. Index cycle of the units is two seconds, contributing directly to a 100% increase in output over production runs previously machined in two operations.

Radial and thrust bronze retainers of the above dimensions formerly were machined on two converted gear chamfering machines. Machining required two complete operations. A high-speed tool, used to drill the roller pockets, was replaced by a carbide tool for reaming. Each operation required a complete revolution of the mechanically actuated index plate as well as replacement of drills between the two operations. To drill radial retainers, the drill penetrated one end of the blank and to drill thrust retainers the drill entered from the periphery towards the center. In both instances the depth of the cut was controlled to .010″. Only one machine handled radial retainers; thrust retainers were drilled on 2nd machine.

Fig. 1. View of radial and thrust retainer machine setups at Rollway. Both radial and thrust retainers are mounted similarly, although radial retainers also are registered from the OD.

To maintain precise tolerances (.003″ to .008″, finish roller pocket size), the machines were kept rigid by setting the feed travel at a fixed rate of speed. But this limitation, in addition to slowing down output, prevented full use of various speed and feed combinations, since even though the rpm speed was variable, the feed rate was constant.

With the new drills, on the other hand, variable rates of speed are possible for particular jobs. Also, due to the new equipment's extreme rigidity, carbide tools now machine roller pockets to finish size in one operation, and maintain depth to .005″. Supported by specially designed mounts, the drill spindles keep drill heads moving smoothly throughout the feed cycle. Failure of any portion of the electrical control circuit results in the machine returning to the start position without damage to the machine or to the work. This interlocked control circuit, is a series of limit switches and re-

"RO" Form Relief means longer life for cutting tools because it leaves supporting metal behind the cutting edge
A
B
C
A
A
B
C
A Sharpens these cutting edges with any degree of form relief.
B No undercutting at intersection — no burr on work piece.
C Diameters can be cylindrically ground or relieved as desired.
There is a constant increase in the number of shops bringing their tool grinding practices up to date by standardizing on form relief sharpening as a means of reducing tool costs. No other fixture offers the ease of set-up and operation and the flexibility of the "RO" Universal Form Relieving Fixture.
GRINDER DIVISION
ROYAL OAK TOOL & MACHINE CO.
29800 STEPHENSON HY.
ROYAL OAK, MICH.
WRITE FOR CATALOG
CIRCLE INFORM-A-GRAM KEY NO. 1101

lays coordinated with the air-hydraulic drill units and air-mechanical indexing system.

Each drill consists of the following prime components: an air-hydraulic drill unit; a head arrangement that swivels either radial or thrust retainers into drilling position; and an index plate operated by a separate pneumatic cylinder.

The workpiece arrangements are supported by heavy circular bases. Each base is bolted to the frame bed. Two bushings, one for radial location and the other for thrust location, are located 90° apart on the underside of the base. A spring-loaded taper pin inserted in the bed frame serves as a location stop for the base bushings. To change from radial to thrust drilling, an operator loosens the pin, pulls the spring-bolt taper pin, and swivels the work head 90° to position.

Air for the drill units, as well as for the index cylinder, is supplied and maintained at an average of 90 psi. Compressed air furnishes the power and oil provides the feed control medium for each unit. The amount of oil allowed to pass through a ball-check orifice determines the rate of feed/inch of the spindle. Less oil resistance creates greater speed, both of which are controlled by a dial on each unit that opens or closes the orifice.

Thus, the self-contained hydraulic system of each drill unit cushions the power provided pneumatically to produce the following sequence: rapid approach to the work, controlled speed and an equally rapid rate of return. Adjustable positive stops control the length of both the rapid and return strokes, allowing the rapid approach to be safely adjusted within a few thousandths of an inch of the work. Drill rpm is controlled by changing the diameters of the drive pulleys.

An air piston actuates the index plate cycle. The piston's travel span controls the length of the index cycle and the number of teeth on the index plate determines the number of indices made per workpiece. A dog, located above the index plate, rides with the plate during the cycle. At the end of one revolution of the plate, the dog strikes a limit switch which stops the cycle and feed actions.

Various fixtures are attached to the work head to accommodate particular retainer ID dimensions. Through the center of this head runs a draw bar, threaded at one end. A handwheel at this end is used to tighten the draw bar, which in turn clamps the workpiece through a holding plate and C-clamp at the other end of the draw bar. Both radial and thrust retainers are mounted similarly, registering from the bore, although radial retainers also are registered from the OD.

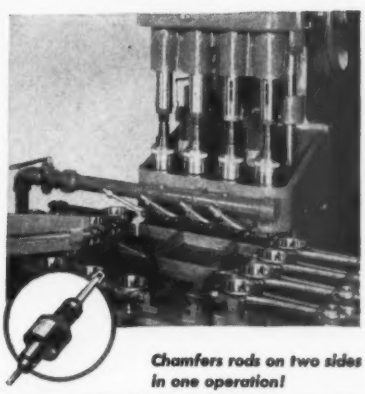
Fig. 2. Work head arrangement for machining thrust retainers. Supported by specially designed mounts, the drill spindles keep drill heads moving smoothly throughout the feed cycle.

SCULLY JONES

"Precision Holding" Tools bring you cost-cutting benefits for tapping, chamfering, milling!

New Safe-Torque Tap Driver reduces tap breakage up to 100%

At Caterpillar Tractor Co., Scully-Jones Safe-Torque Tap Drivers made possible 25% cost reduction, 10-12% manpower saving, 5% production increase, and 400% increase in tap life. You can save, too, by controlling adverse tapping conditions with this adjustable-torque driver. It releases completely when torque reaches danger point. *Write for Bulletin 20-50.*

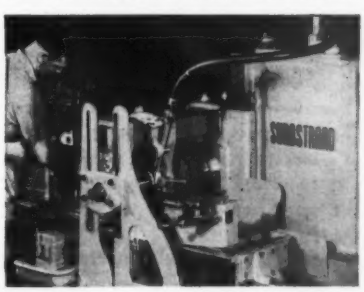


Chamfers rods on two sides in one operation!

At Studebaker Corp., Scully-Jones Automatic Recessing Tools prove their accuracy and speed. Each cycle they produce two chamfers in four connecting rod bores. The position of cutters for location and depth of cut is controlled within .001". Perhaps you have similar operations you can combine and simplify by using these *Automatic* Recessing Tools. *Write for Bulletin 10-50.*

Rugged Arbors assure long tool life at high speeds!

Rigidity of machine and tooling *is a must* for gang-milling these tough steel forgings . . . 46 per hour! Sundstrand specified Scully-Jones Style "B" Milling Arbors because they're tough and *precision built* to run true during fast, heavy cuts. Take the gamble out of milling with Scully-Jones Arbors and Adapters. *Write for Bulletin 2-50.*



SCULLY-JONES AND COMPANY, 1913 S. ROCKWELL ST., CHICAGO 8, ILL.

SCULLY-JONES

"Precision Holding" for holding precision

Call Scully-Jones local representative or distributor—factory-trained "Precision Tool and Work Holding Specialist"—for complete information and service.

CIRCLE INFORM-A-GRAM KEY NO. 1111

• *New Equipment*
• *New Materials*
• *New Literature*

WHAT'S NEW

For Effective Dry Color Mixing, Injection Molders Supply Co., 3514 Lee Rd., Cleveland 20, Ohio, manufactures drum, hex barrel, and fixed drum tumblers in all sizes. Hex barrel tumblers are especially for color concentrates and part finishing; the fixed drum tumbler has been developed for blending and dry coloring in injection plants.
Circle Inform-A-Gram No. E1.

Polyethylene, originally developed as a dielectric, is bidding for structural applications in welded units, primarily where light weights and corrosion resistance are decisive factors, according to a recent report on important polyethylene applications. Advantages of the material include relatively high softening point, good mechanical properties, resistance to a broad range of chemicals, superior electrical insulating properties, and facility of fabrication. The report on polyethylene is yours from the American Agile Corp., Box 168, Bedford, Ohio, or —
Circle Inform-A-Gram No. E2.

Virtually Pure PVC (nonplasticized polyvinylchloride) is being molded by engineers at Stokes Molded Products Div'n of The Electric Storage Battery Co., Trenton, N. J., as a result of new molding techniques developed there. Economical PVC has replaced stainless steel, brass, and other similar alloys in many instances because of its lack of weight coupled with strength and resistance to many chemicals and reagents.
Circle Inform-A-Gram No. E3.

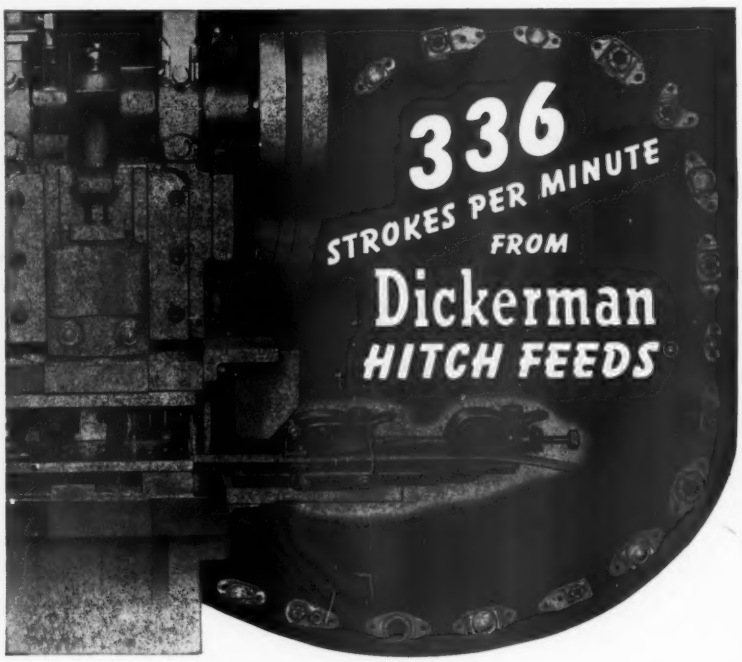
The inner walls of America's homes of the future may be of honey-comb construction with plastic surfacing on both sides, prophesies General Electric's W. L. Rodich, General Manager of the Laminated and Insulating Department. This novel type of wall construction, he says, should lend itself to perforation and the transfer of warm or cool air to or from the room and could be easily powered to expand or contract the various living, dining, and recreational areas in the home as required.

Gain 15% to 40% Plasticizing Capacity and at the same time reduce downtime expense and heater repairs with an IMS "Superheater" especially made for Reed-Prentice type molding machines. Get full information from Injection Molders Supply Co., 3514 Lee Rd., Cleveland 20, Ohio or—**Inform-A-Gram No. E4.**

Plastic Faced Dies. Drop hammer and stretch dies are faced with plastic at Chance Vought Aircraft, Inc., to produce cheaper and more durable dies. The facing method cuts die making time without sacrificing quality and accuracy, produces a part with fewer tool marks, and protects the die from corrosion while in storage.

The Kirksite dies are cast in the usual manner, except that a normal plaster pattern is used instead of the shrink scale pattern. The die and punch are sandblasted to get a good bond between the metal and the resin. Then the resin is poured between the male plaster splash and the female metal die.

After three hours' curing time the plaster is removed, leaving the female die with ¼" surface coat of resin requiring no coping. The male die is surfaced with a resilient epoxy resin by using the female die as a pattern.



AN UNBELIEVABLE — YET TRUE — DEMONSTRATION OF DICKERMAN HITCH FEED PERFORMANCE AND ECONOMY!

Aircraft fasteners by the millions roll steadily from the Dickerman-equipped presses of a leading West Coast manufacturer. Feeding at the incredible rate of 336 strokes per minute, Dickerman 2½" Hitch Feeds have operated flawlessly day after day, month after month — setting new records of production and economy! Moving a .020" thick strip of cold rolled steel into a 3-station piloted die, the Dickerman feeds uniformly advance the strip ⅜" per stroke — with never a "miss" or a jam!

This actual case history is indisputable evidence that *Dickerman hitch feeds will feed precisely at virtually any speed the tooling is built to withstand.* Remember — in the complete, dependable Dickerman line, there's a versatile hitch feed to give MAXIMUM performance and production at real savings of days and dollars.

Send today for descriptive literature on the complete Dickerman line of money-making Die Feeds.

Dickerman
H. E. DICKERMAN MFG. CO.
324-249 Albany St. • Springfield, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 1121

IN PLASTICS?

• *Plastics Fabrication*
• *Plastic Tooling*
• *Plastics Molding*

A 20 oz Molding Machine with locking tonnage and mold area equal to most 32 oz machines has been introduced by Lester-Phoenix, Inc., 2711 Church Ave., Cleveland 13, Ohio. Model L-2-20 will mold 20 oz of polystyrene or 80 cu in of any other granular thermoplastic material. It is designed to mold relatively large parts such as refrigerator strips and panels, and trays. The L-2-20 is readily adapted to nylon molding. **Inform-A-Gram No. E5.**

Custom Casting of multi-component resin mixes such as ethoxylenes, polysulfides, polyamides, and polyurethanes is offered by Applied Engineering Associates, 1952 Flushing Ave., Brooklyn 37, N. Y. Portable facilities are planned for handling foamed phenolics and polyurethanes at the customer's plant to include such applications as buoyancy chambers and thermal and acoustical insulations.
Circle Inform-A-Gram No. E6.

A Dimensionally Stable Flexible Casting Epoxy with exceptional impact strength, ideal for drop hammer punches, form and draw dies, pressure pads, and clamping cushions, is offered as L-940 Flexible Epoxy. Its tough resilient surface will compress and eliminate the need for metal clearance between punch and die in most cases. Rezolin, Inc., 5736 W. 96 St., Los Angeles 45, Calif., or —
Circle Inform-A-Gram No. E7.

Plastic boxes the size and shape of the popular "slip-together" cigarette boxes are being used by Besly-Welles Corp. to package high speed and carbon steel taps. The polyethylene containers are durable, oil and grease resistant, and will not deteriorate with age or use. A filler of plastic "Styrofoam" holds the taps in position. Easy-to-read labels with full identification simplify stocking.

Lunn Laminates, Inc., leading reinforced plastics fabricator, now offers a complete tool and die service employing all forms of dies—plastics, steel, and combination plastics-steel. This expansion is a result of Lunn's acquiring Ueber Tool & Manufacturing Co., Detroit.

Furane Plastics is expanding its activities in the field of epoxy tooling resins by taking over certain epoxy formulating activities of **Wal-Mar Plastics, Inc.** Wal-Mar will continue to devote its attention to the manufacture and development of plastic tooling for the aircraft and automotive industries.

A Diagrammatical Explanation of how vacuum and drape forming are used to produce three-dimensional display, signs, packages, lenses, appliance and machine parts, etc., is featured in literature from the Marblette Corp., 37-21 Thirtieth St., Long Island City 1, N. Y. Case histories supplement the technical information. **Circle Inform-A-Gram No. E8.**

The British magazine PLASTICS reported in the January issue on the successful application of Cerrocast, a low-melting-point alloy as a sprayed on wear surface for low-pressure injection molds made of mild steel or cast resin. The techniques are still to be perfected, but the practice of sprayed-on mold surfaces is considered to have important potential.

THIS ONE WAS EASY . . .
A Nilson 4-Slide, Number 1, forms 150 drapery hooks per minute from 0.70 basic steel wire. Nilson 4-Slides form wire or ribbon stock from the coil. They straighten, feed, pierce, blank, swage, stamp or coin, cut and form in one, fast, automatic operation . . . accommodate wire up to .5" dia., in feeds to 32" max., and ribbon up to 3.5" wide. Press sections from 5 to 75 tons. Send for catalog.

NILSON 4-SLIDE TAKES A TOUGH ONE

Mass production of body trim clips for a leading make automobile proved a complex forming problem. A. H. Nilson's 4-Slide (Model S-4-T) did the job, forming .025" x 3", 1065 C.R.A. steel at 54 strokes per minute! Accurate, fast, and automatic, Nilson 4-Slides keep pace with one of the nation's biggest industries.

A.H. NILSON MACHINE COMPANY
1522 RAILROAD AVENUE, BRIDGEPORT 5, CONN.
Automatic Chain Making Machines : Staple Forming Machines : Wire and Stock Reels : Wire Straightening Equipment : Slide Feeds for Presses

CIRCLE INFORM-A-GRAM KEY NO. 1131

For Ease and Convenience Use TOOLING and PRODUCTION Inform-A-Gram Cards

Photos of Hallowell Adjustable Steel Shelving in Standard Pressed Steel's new bulletin show a few of more than 1000 possible combinations of shelving for various purposes. Assembly of the Hallowell shelves is faster because of accurate multiple piercing and forming of all parts. Write to Hallowell Div'n, Standard Pressed Steel, Box 600, Jenkintown, Pa. or — **Inform-A-Gram No. B1.**

For Fast Piercing in small lot and semi-production work the Wiedemann R-61 Turret Punch press is what you need. Bulletin 61 from Wiedemann Machine Co., 4272 Wissahickon Ave., Philadelphia 32, illustrates typical turret layouts of the company's "no setup" piercing method and gives machine specifications.
Circle Inform-A-Gram No. B2.

SPECIFY..
Morton
There is a MORTON Fixture Clamp and Fixture Component to meet your most exacting requirements. All precision made of heat treated selected steel, cadmium plated and rust proof mid-nite black finish.
Complete Clamp Assemblies or any of their Component Parts. ECONOMIZE. Use them as Standards.
WRITE TODAY
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MORTON MACHINE WORKS
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Lovejoy Milling Cutter Arbors are made of alloy steel, heat treated for maximum rigidity, and precision ground to ensure concentricity of nose and taper shank. Standard

shell end mill arbors and heavy duty flanged arbors are completely described and illustrated in the new 8-page folder by Lovejoy Tool Co., Inc., Springfield, Vt. **Circle No. B3.**

Six New Chucks have been added to Supreme Products' chuck line during the past few months. Model 15T33, exclusive with Supreme, has a full 0" to ½" capacity but has the small diameter body of chucks with far less range of capacity. Other capacities range to ¾". Catalog sheets are available from Supreme Products, Inc., 2222 S. Calumet, Chicago 16, Ill., or — **Circle No. B4.**

Three Types of Die Heads are illustrated and described in the recently revised Landis Hardened and Ground Threading Heads Bulletin (No. FO 80-5). Design features and complete specifications for the Lanco, Landex, and Landmatic heads are included. Landis Machine Co., Waynesboro, Pa. **Circle Inform-A-Gram No. B5.**

Drilling Machines, Models D-24 and D-28 by Sibley Machine & Foundry Corp., South Bend 23, Ind., are fully described and illustrated in new Catalog No. 68A from that company. The Model D's offer 25" head travel on the column and an 11" spindle feed to permit a wide range of drilling. **Inform-A-Gram No. B6.**

Water Cooled Air Compressors are described and illustrated in a new 8-Page folder from Quincy Compressor Co., Quincy, Ill. Included are features, dimensions, and specifications for the company's line of compressors with the new "safe-Q-lube" full pressure lubricating system for heavy duty industrial use.
Circle Inform-A-Gram No. B7.

TOOLING and PRODUCTION'S Inform-A-Gram Section is a CARDload of Information

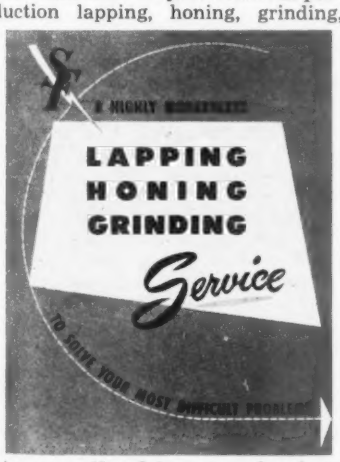
External and Internal Contours of cams, templates, blanking punches, and dies are milled and ground directly from simple line drawings with the Model 104 Electronic Template and Cam Machine from Pratt & Whitney. A new 8-page circular, No. 579, illustrates and describes the machine, what it does, and how it operates. Get your copy from Pratt & Whitney, Div'n of Niles-Bement-Pond Co., West Hartford 1, Conn., or — **Circle Inform-A-Gram No. B8.**

Abrasive Segments are becoming increasingly popular for various surface grinding and machine knife grinding jobs. Simonds Abrasive Co., Philadelphia 37, Pa., has published Bulletin ESA-188 describing the segments and listing recommendations for their use on various materials. **Inform-A-Gram No. B9.**

"How to Prevent Punch Press Accidents with Martin Safety Press Tools" is both catalog and collection of hints on the choice of proper tools for safe press operation. Specifications for a variey of safety tongs, vacuum equipment, and foot treadle guards are included. W. I. Martin & Co., 224 S. Michigan Ave., Chicago 4, or **Circle Inform-A-Gram No. B10.**

"How Plaster Mold Castings Pare Your Costs" explains how parts in limited or pilot runs are produced in plaster molds to achieve precision castings at low cost. Graphs show quantity levels at which parts can be most economically cast. Hale Foundry Co., 1680 Fall St., Cleveland, Ohio. **Circle Inform-A-Gram No. B11.**

Finishing Problems such as holding exact finishes and parallelism in production lapping, honing, grinding,



etc., are offered in a new brochure from a contract finishing specialist, Surface Finishes, Inc., 172 Official Rd., Addison, Ill. **Circle No. B12.**

Ideal for Measuring "O" Ring Grooves, tapers, recesses, inside spherical radii, and out-of-round, and with a quick change of measuring tips, snap ring grooves and bores, is the Mueller precision Undercut Measuring Gage. Bulletin UMG-55 from Mueller Laboratory, 239 W. Maple Ave., Monrovia, Calif., completely describes the gage. **Circle Inform-A-Gram No. B13.**

"What You Should Know About Buying and Renting Machine Tools" discusses leasing and time-payment plans, makes cost comparisons, and outlines depreciation allowances under new tax codes so the executive can be prepared to appraise his own situation and arrive at the best conclusion when procuring equipment. Gisholt Machine Co., Madison 10, Wis. **Circle Inform-A-Gram No. B14.**

LOOK FOR THESE FEATURES IN DRILL JIG BUSHINGS
EX-CELL-O
HAS THEM ALL
MATERIAL . . high chrome and carbon bearing steel for maximum wear.
FINISH . . precision ground inside and out, and under the head for perfect bearing.
CONCENTRICITY . . assured by grinding on arbors after the holes are finished.
HARDNESS . deep-hardened to 62-64 Rockwell "C" in automatic equipment.
UNIFORMITY . . of material, dimensions, finish, and hardness.
PROMPT DELIVERY . . from stocks of standard sizes in Detroit, New York, Los Angeles, and London, Canada.
REPUTATION . largest bushing users in the country are Ex-Cell-O customers.
Write for Bushing Catalog.
54-32
XLO
EX-CELL-O CORPORATION
DETROIT 32, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1151

Grinding Operations with both standard equipment and optional accessory equipment are clearly pictured and explained in Landis Tool's Catalog K-53 on the company's 12" x 28" Universal and tool precision cylindrical grinders. Complete specifications are listed. Landis Tool Co., Waynesboro, Pa.
Circle Inform-A-Gram No. B15.

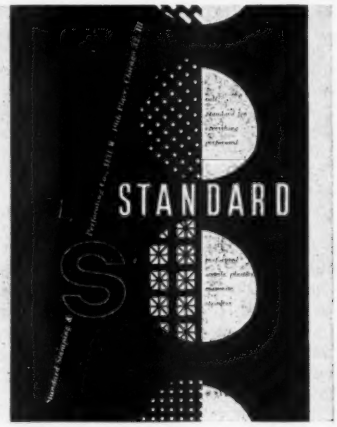
Carbide Masonry Drills are the subject of an illustrated circular from Whitman & Barnes, Div'n of United Drill & Tool Corp., Plymouth, Mich. Notes on the care of carbide tipped spiral fluted masonry drills are featured. **Inform-A-Gram No. B16.**

Four Types of ACEC Motors, vertical, hollow shaft, "Sadi" planetary geared, and face mounted, from ¾ to 200 hp, are described in a pocket price and stock list now available from Belgian Electric Sales Corp., 40 E. 49 St., New York 17, or —
Circle Inform-A-Gram No. B17.

Spring-Loaded Pins and pin wrenches, swivel pads, shoes, and screws for fixtures, jigs, dies, clamps, etc. manufactured by Techni-Tool Products, Inc., are shown in Catalog "D" from M. C. Crawford Co., 2521 W. Slauson Ave., Los Angeles 43, Calif. **Circle Inform-A-Gram No. B18.**

A New Forgings Catalog and engineer's handbook by Scovill Mfg. Co., Waterbury 20, Conn., illustrates types of forgings the firm produces from more than 20 non-ferrous materials. Forging data including nominal composition of the alloys and typical mechanical properties are also covered. **Circle Inform-A-Gram No. B19.**

The Pocket-Size Perforated Metal catalog now available from Standard Stamping & Perforating, 3131 W. 49 St., Chicago 32, contains 114 pages of buying information and data on



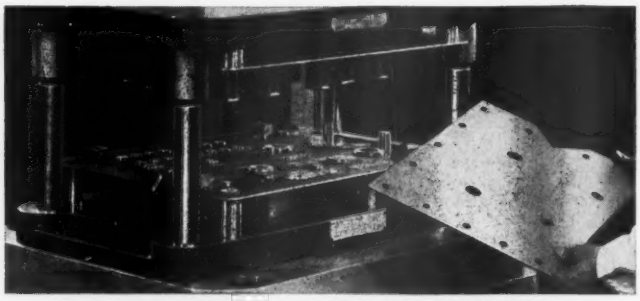
manufacturing processes and end uses of perforated metal that should be of special value to those interested in the design and manufacture of products of the metal.
Circle Inform-A-Gram No. B20.

Chemical and Physical Descriptions plus uses of nine grades of "Ampco" metal, a series of aluminum bronze alloys of the high aluminum, high iron type, are enumerated in Bulletin 33a published by Ampco Metal, Inc., Milwaukee 46, Wis. The various grades of the alloy cover a wide range of physical properties, offering a wide selection for any particular application.
Circle Inform-A-Gram No. B21.

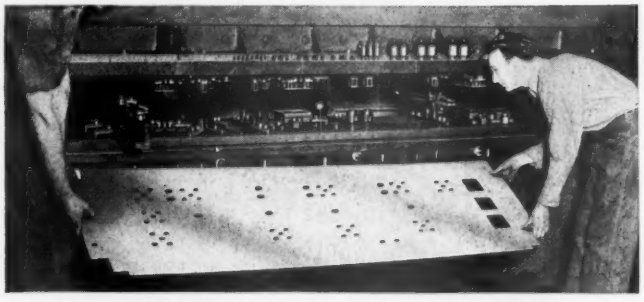
The New Conveyor Catalog from Samuel Olson Mfg. Co., Inc., 2423-27 Bloomingdale Ave., Chicago 47, describes and illustrates a wide range of types and sizes of conveyors especially adapted to particular loading and unloading, storage, warehousing, and order picking situations.
Circle Inform-A-Gram No. B22.

The "Color-Glance" Brinell Hardness Tester, a development of Steel City Testing Machines, Inc., is illustrated on a 4-color catalog sheet. Complete specifications are listed with a discussion of the unit's features which make possible high speed production testing and complete automatic operation when required. Copies of Form KE 1154 may be secured from Steel City Testing Machines, Inc., 8817 Lyndon Ave., Detroit 38, or— **Circle No. B23.**

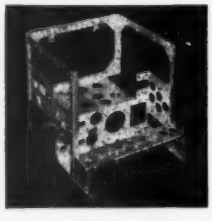
OVER 2,000 PLANTS *are making up their Metal Perforating Die Sets by Whistler methods*



WHISTLER **MAGNETIC PERFORATING** DIES



WHISTLER **ADJUSTABLE PERFORATING** DIES



- Lower die-making costs.
- Start production quicker.
- Save work handling labor.
- Increase press production.
- Versatile in job application.
- Perforate materials to ⅜" thick mild steel.
- Combine horizontal and vertical perforating operations.
- Work in practically any size or type of press.
- All parts re-usable and interchangeable.
- Precision assured on short or long runs.
- Parts interchangeable right in the press.
- Magnetic dies assembled on templates.
- Adjustable dies assembled on Tee slot die sets.
- Save floor and storage space.
- Die investment not "tied up."

SEE FOR YOURSELF *Without Obligation*

Our *illustrated* Catalogs show the simplicity, economy and versatility of Whistler methods. See for yourself why Whistler customers are the biggest names in industry.

WHISTLER DIES ARE CUTTING COSTS FROM COAST TO COAST

S. B. WHISTLER & SONS, INC.
748 Military Road Buffalo 23, New York

CIRCLE INFORM-A-GRAM KEY NO. 1161

Design Features of the Vickers ¾ hp variable speed hydraulic transmission for industrial application is featured in a bulletin from Vickers Inc., 1400 Oakman Blvd., Detroit 32, Mich. Bulletin No. 47-40B presents a chart of output speed ranges for various recommended input speeds, specifications, and installation drawings for both handwheel controlled and servo controlled models of the hydraulic units.
Circle Inform-A-Gram No. B24.

Newark Automatic Gear Hobbers for accurately producing helical and herringbone gears, worm wheels, and spur gears, are described in new Bulletin No. 156 from Potter & Johnston Co., Newport Ave., Pawtucket, R. I. The Newark No. 3 (12" dia) is used for hobbing small and medium sized gears, worm wheels, and long spline shafts; the No. 5 (60" dia) is a large capacity machine. **Circle No. B25.**

Stock Gears. Featured in the 200-page catalog published by Universal Gear Works, Inc., 1301 E. McNichols, Detroit 3, are specifications and prices for over 8,000 stock items including gears, spockets, chains, and splines. Sections of the booklet describe the "1600" Series drilling units, grinders, etc., and the company's manufacturing facilities.
Circle Inform-A-Gram No. B26.

Hand Detachable, Positive Drive Counterbores, countersinks, holders, and pilots are illustrated and listed in new Bulletin 60446 from Continental Tool Works, Div'n of Ex-Cell-O Corp., 1200 Oakman Blvd., Detroit 32, Mich. Continental tools are available individually or in sets, as described in the bulletin. **No. B27.**

The New Compression Fixture and Setting Gage for recessing tools, recently developed by Scully-Jones and Co., Chicago, is described in a bulletin just released. Details of the company's Micrometer Grinding Fixture for circular form tools used in

automatic screw machines and recessing tools are also given. These products speed the setting of recessing tools and provide a quick, sure method for sharpening circular form cutters, assuring accurate grooving operations. **Circle No. B28.**

Stamping, Drawing, Forming and heading facilities of the Plume & Atwood Mfg. Co., Fabricating Div'n, Thomaston, Conn., are illustrated in a 12-page catalog. The booklet shows how combining operations produced several items at P & A at substantial savings. **Circle No. B29.**

Design Features of 5" Hydraulic Cam Grinders, type DH, by Landis Tool Co., Waynesboro, Pa., are comprehensively described in Catalog Q-46. Detailed photos illustrate various sizes and types of camshafts in grinding position on the machines.
Circle Inform-A-Gram No. B30.

Low Pressure Cylinders, 650 psi maximum, are re-cataloged and described in Catalog 101 from the Nopak Div'n of the Gallan-Henning Mfg. Co., 2743 S. 31 St., Milwaukee 46, Wis.
Circle Inform-A-Gram No. B31.

"Take the Guess Out of Nut and Bolt Tightening with Parish Acuritork Tools" says the B. E. Parish Co., 3340 Fenkell Ave., Detroit 21, in a new bulletin on the "Acuritork," a compact, adjustable, automatic torque wrench which may be used as a hand tool or with power tools.
Circle Inform-A-Gram No. B32.

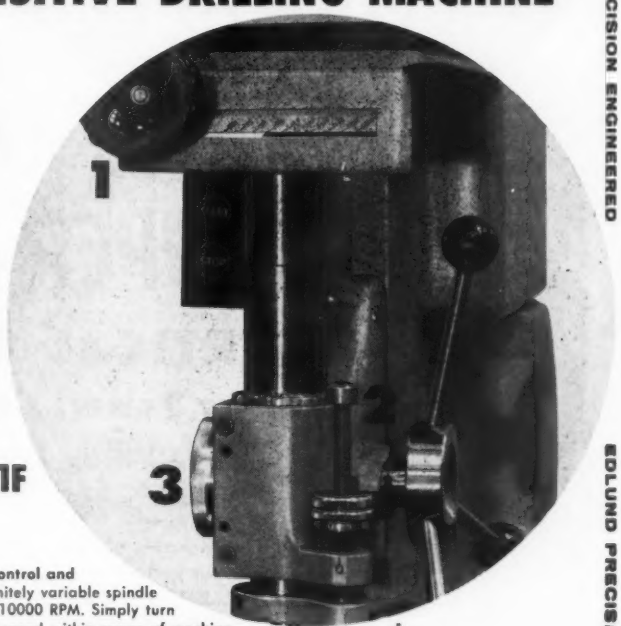
EDLUND PRECISION ENGINEERED EDLUND PRECISION ENGINEERED

new

SENSITIVE DRILLING MACHINE

EDLUND

Model 1F

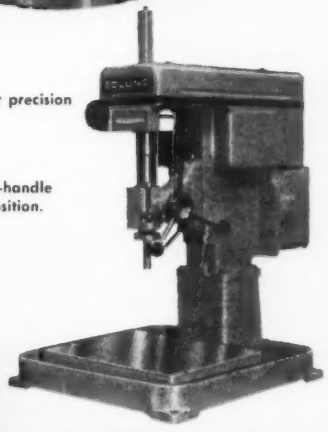


1
Vari-Speed Control and Indicator Infinitely variable spindle speeds up to 10000 RPM. Simply turn knob for any speed within range of machine. Swift, Powerful, Positive Action.

2
Micrometer Graduated Depth Gauge
Permits accurate prepositioned depth control for precision drilling. Clearly graduated to .001".

3
Adjustable Spindle Tension Control
Compensates for weights of various drills. Three-handle feed lever lets operator choose best feeding position.

Specifications
Overhang ..... 7"
Capacity (Cast Iron) ..... ½"
#1 Morse Taper or Jacobs Chuck ... 0-½"
Speed Range—Optional ....
625 to 5000 RPM
1250 to 10000 RPM
Pedestal or Bench Models
Send for Free Illustrated Bulletin #160



EDLUND MACHINERY CO.
Division Bradley-Edlund Corp. Cortland, N. Y.

EDLUND PRECISION ENGINEERED

Affiliated with Precision Castings Co., Inc. Edlund Representatives in Major Cities
CIRCLE INFORM-A-GRAM KEY NO. 1171

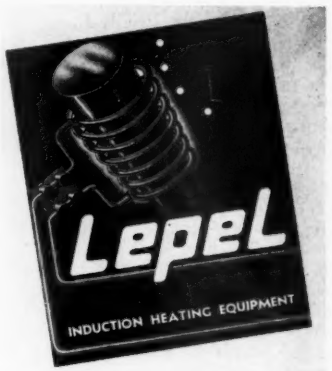
Interchangeability of Collets is a money-saving feature of South Bend collets. The No. 5, for instance, fits all South Bend lathes of 10" and larger size. These collets and many collet attachments are covered in Bulletin 5501 from South Bend Lathe Works, South Bend 22, Ind., or— **Circle Inform-A-Gram No. B33.**

Blasting Power of the Rotoblast system is based on the principle of controlled centrifugal force. Bulletin No. 227 describes the type RG Rotoblast unit used on various types of blast cleaning equipment manufactured by Pangborn, with cutaway views illustrating construction features and pointing out efficiency and simplicity of operation and maintenance. Pangborn Corp., Hagerstown, Md. **Circle Inform-A-Gram No. B34.**

Grooving Tool Manual. A complete reference catalog (No. GT 2-53) on cutting internal recesses has been published by Waldes Kohinoor, Inc., 47-16 Austel Pl., Long Island City 1, N. Y., to describe the Waldes Truarc Grooving Tool. Subjects covered in detail are: cutting speeds and ranges, accessory parts, use of the tool, and 17 case histories. **Circle Inform-A-Gram No. B35.**

Applications for the Keller "Ring Former" are illustrated in Bulletin 51, along with specifications and operating principles for this unit which forms and positions ¼" to 3" rings of brazing wire or soft solder. This eliminates stocking such rings and each one formed on the Keller is clean and perfect. Keller Tool Co., Grand Haven, Mich. **Circle No. B36.**

The Principles of Induction Heating, along with applications of this electronic process and hints on techniques are reported in the comprehensive new Lepel High Frequency Induction Heating Catalog. Half of



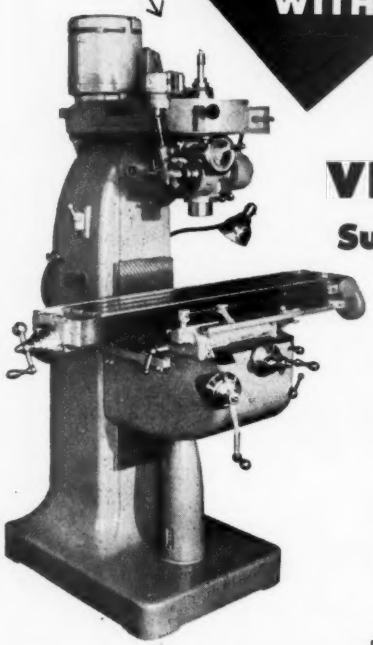
the booklet's 38 pages deal with illustrated easy-to-understand principles; the remainder features types of equipment and accessories. Lepel High Frequency Laboratories, Inc., 55 St. and 37 Ave., Woodside 77, New York, N. Y. **Inform-A-Gram No. B37.**

The Wheelabrator "Tumblast," an airless blast cleaning machine, is useful for finishing, deburring, and cleaning. Bulletin No. 124-B describes the 48" by 42" Tumblast which has a 17½ cu ft operating load capacity. American Wheelabrator & Equipment Co., 1183 S. Byrkit St., Mishawaka, Ind. **Circle Inform-A-Gram No. B38.**

Pennsylvania Spring Testers are designed for the fast, accurate testing of tension, compression, or leaf springs, or for checking the force required to engage or disengage mating sub-assemblies and components. A catalog folder now available from the National Store Specialty Co., manufacturers of Pennsylvania commercial and industrial scales, Bareville, Pa., describes the unit and lists operating instructions. **Circle Inform-A-Gram No. B39.**

Fifty Small Precision Cutting Tools that perform in a single operation work often requiring as many as five separate machinings, are described in a new catalog sheet from Woodruff & Stokes, Inc., 343 Lincoln St., Hingham, Mass. Featured are photos of the multi-operation tools plus profile drawings of their cutting actions. **Circle Inform-A-Gram No. B40.**

Again Index
STEPS FAR OUT IN FRONT WITH the New
SUPER 55
VERTICAL MILL
Super Power, Capacity
Rigidity, Precision



Always in the Lead through constant improvements, Index announces this outstanding machine that will give you super performance in your BORING, MILLING and DRILLING operations— 1½ H. P. Head—New spindle brake, Dynamically Balanced Cast Iron Pulleys and Drive System give 50% more capacity. Many more advantages. Get the facts. Write for Literature today.

OTHER MODELS—A COMPLETE LINE FOR YOUR EVERY REQUIREMENT

INDEX MACHINE CO.
541 N. MECHANIC STREET JACKSON, MICHIGAN

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CIRCLE INFORM-A-GRAM KEY NO. 1181

The Ferguson "Intermittor" standard precision index tables for high speed production are described in new 12-page Catalog No. 300. Assembly drawings, tables of load ratings, dimensions of over 150 models, and data on the Ferguson Roller Gear Drive indexing mechanism are included. Ferguson Machine & Tool Co., Roller Gear Div'n, Box 191, St. Louis 21, Mo.
Circle Inform-A-Gram No. B41.

"Sectionalized Automation," according to a booklet of that name from The Cross Co., prevents loss of production during periods of downtime by dividing a Transfer-matic into sections to permit shutting down some of the operations without interrupting the production of others. A photographic account of a 350' sectionalized automated line performing 555 operations on V-8 cylinder blocks graphically illustrates the company's point. Get your copy from The Cross Co., Detroit 7, Mich., or — **Circle Inform-A-Gram No. B42.**

"Metalworking Machinery" shows cold process equipment designed and manufactured by The Waterbury Farrel Foundry & Machine Co., Waterbury, Conn. The company does not build hot-forging machinery nor machine tools such as milling machines and grinders, but specializes in threaders, slotters, power presses, etc. **Circle Inform-A-Gram No. B43.**

Socket Screw Features, manufacturing methods, and applications are published in two new bulletins by the Socket Screw Div'n of The Bristol Co., Waterbury 20, Conn. Tables of nominal sizes, basic dimensions, and tolerances of the American Standards for Screw Threads are included, as well as engineering data and specific application information. Bulletin 898 gives details on hex type socket screws; Bulletin 899, multiple spline socket screws.
Circle Inform-A-Gram No. B44.

The Newark Automatic Gear Cutters described in Bulletin No. 157 from Potter & Johnston are for spur gear cutting only. Four standard models provide work capacities to 100" dia. Get your copy from Potter & Johnston Co., Newport Ave., Pawtucket, R. I. — or **Circle No. B45.**

"How To Double Your Warehouse Capacity" is a new booklet that illustrates how sizeable savings of space and time are nearly always possible through better use of existing facilities and, where advisable, through the use of special storage equipment. The advantage of utilizing ceiling height as well as floor space is especially significant. Get catalog No. 700 from The Frick-Gallagher Mfg. Co., Wellston, Ohio, or— **Circle Inform-A-Gram No. B46.**

Erick "Magna Holder" magnetic base indicator holders are valuable in many industrial departments for holding dial indicators, portable lighting units, safety shields, and magnifying glasses. Catalog No. 766 from Cullen Mfg. Co., Racine, Wis., illustrates the holder and its many accessories. **Circle No. B47.**

The Electro-Staynew Mist Collector for eliminating oil mist and smoke at its source is fully described in Bulletin 420, published by Dollinger Corp., 11 Centre Park, Rochester 3, N. Y. Designed to be mounted on or near high speed grinding and cutting machines, the self-contained Mist Collector removes over 90% of oil mist and smoke and returns clear air to the shop.
Circle Inform-A-Gram No. B48.

The Semi-Automatic Internal Grinder by Parker-Majestic has a cam actuated automatic sizing unit which feeds the grinding wheel into the workpiece. Features of the machine are described and illustrated in a new bulletin from Parker-Majestic, Inc., 147 Jos. Campau Ave., Detroit 7, Mich., or—
Circle Inform-A-Gram No. B49.

GRINDING TIME CUT 50%

New Rotor D-4S Air Grinder pays for itself in 12 weeks

Job: Grinding defects in holes of castings with cone wheel (size 2¼" x 3½" x ⅜"). Formerly used 3600 rpm electric grinder (3 phase, 220v.). Job took 8 minutes—too slow.

Solution: Rotor Application Engineer suggested changing to Rotor D-4S Cone Grinder—speed 8500 rpm.

Results: Saves 4 minutes per casting; doubles output. With 50% use factor, savings paid for new Rotor Grinder in 12 weeks. Wheels last longer. Tool is lighter (only 8¼ lbs.); easier to handle. No tool stalling—even when crowded in hole.

Get the Rotor Engineer on *your* portable tool jobs to save *you* money!

APPLICATION

Rotor D-4 Air Grinders are available with straight or grip handle at 8500 rpm for cone wheels and 4" elastic wheels and at 6000 rpm for cone wheels, 6" elastic wheels and 4" vitrified wheels.

ASK FOR BULLETIN 43

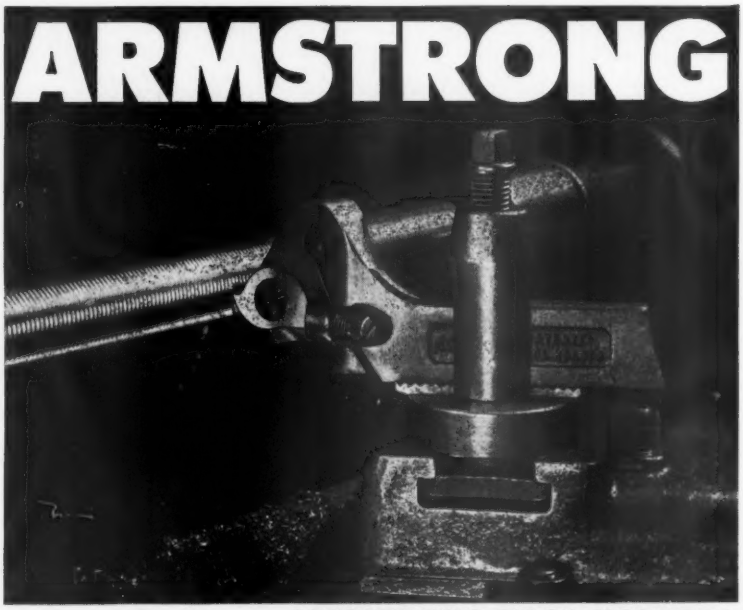
THE ROTOR TOOL CO.
CLEVELAND OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1191

Low Temperature Brazing case history studies are illustrated in Bulletin 67 from Handy & Harman, 82 Fulton St., New York 38. Techniques employed at Victor Adding Machine Co., and Homelite Corp., to mention two, describe the use of "Easy-Flo" and "Sil Fos" alloys and various production setups.
Circle Inform-A-Gram No. B50.

Field Reports 136 and 138 covering typical particle sizes of molybdenum dissulfide products and the lubrication of office machinery parts and sub-assemblies are available from The Alpha Corp., 65 Harvard Ave., Stamford, Conn. Field Report 136 shows a few of the friction parts which one manufacturer coats with "Molykote" during assembly. Report 138 uses micro-photographs to show comparative particle sizes of various grades of Molykote lubricants.
Circle Inform-A-Gram No. B51.

The Portable Arc Welder by Illumi Tronic Engineering Co., 680 E. Taylor Ave., Sunnyvale, Calif., was designed especially for plant maintenance and construction work. A pamphlet from the manufacturer shows features and uses, and lists complete specifications. **Circle No. B52.**



The ARMSTRONG Threading Tool takes interchangeable high speed steel form-cutters which require only flat top grinding to resharpen—always hold their true thread form.

Write for catalog

Each year ARMSTRONG TOOL HOLDERS become more important to you

Every rise in labor costs, every added tax, every overhead burden, every increase in cutting steel prices, every new, more costly machine tool, all increase the importance of ARMSTRONG TOOL HOLDERS to profitable operation.

ARMSTRONG TOOL HOLDERS reduce direct tooling costs to an absolute minimum—"Saves: All Forging, 70% Grinding, 90% High Speed Steel."

ARMSTRONG TOOL HOLDERS reduce tooling-up time to minutes, to the selection and adjustment of the holder and cutter.

ARMSTRONG TOOL HOLDERS permit increased speeds and feeds—produce more pieces per hour per machine tool.

ARMSTRONG TOOL HOLDERS are efficient for they embody a perfection gained by over 50 years of specialization in the development and refinement of tool holders.

ARMSTRONG TOOL HOLDERS are inexpensive because they are quantity produced by modern methods, for a world market . . . are used by over 96% of the machine shops and tool rooms . . . are carried in stock for your convenience by all industrial distributors of consequence.

Buy ARMSTRONG TOOLS from your Industrial Distributor

ARMSTRONG BROS. TOOL CO. "The Tool Holder People" 5220 W. ARMSTRONG AVENUE CHICAGO 30, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 1201

Specific "Dag" Colloidal Graphite dispersions for many industrial uses and techniques of application, including the new stencil pattern application for controlled welding, are presented in Bulletin 427, "Colloidal Graphite as a Parting Compound," from Acheson Colloids Co., Div'n of Acheson Industries, Port Huron, Mich. **Inform-A-Gram No. B53.**

More Case Histories on Sciaky 3-phase electric resistance welding equipment are contained in Vol. 4, No. 3 of "Resistance Welding at Work." Welding techniques at three aluminum fabricating plants are featured. Sciaky Bros., Inc., 4915 W. 67 St., Chicago.
Circle Inform-A-Gram No. B54.

Standardization and Quantity Production has allowed the Skinner Co. to reduce prices on its line of soft blank top jaws. A new folder and price list is now available from The Skinner Chuck Co., New Britain, Conn. Long pointed jaws for inside gripping and small diameter work are new additions to the Skinner line, and medium and heavy duty tongue, groove, and serrated type jaws are also included in Bulletin SJ-67.
Circle Inform-A-Gram No. B55.

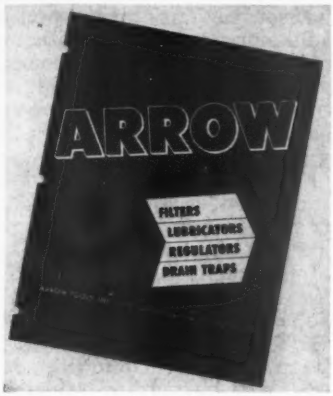
Resistance Brazing is discussed in detail in the current "Ampco Welding News." Also featured is an article on how a Pines Bender equipped with Ampco wiper dies and Ampco-Trode overlaid mandrels have saved the aircraft industry as much as $14,000 per plane. Ampco-Metal, Inc., 1745 S. 38 St., Milwaukee 46, Wis., or —
Circle Inform-A-Gram No. B56.

Fifty Standard Size Wheels and matching abrasive bands in grits from 24 to 400 are pictured in the new "Even-Cut" Band Wheel Catalog. Photos show band wheels in

even-cut
ABRASIVE
Band Wheels
FASTER, BETTER, GRINDING, FINISHING and POLISHING of
METAL · WOOD · PLASTIC · RUBBER · GLASS · TILE · MARBLE
even-cut ABRASIVE BAND CO.

use and illustrate the principle by which Even-Cut wheels give flat cutting surface for their full width. Even-Cut Abrasive Band Co., 8212 Carnegie Ave., Cleveland 3, or—
Circle Inform-A-Gram No. B57.

Pneumatic Controls in the Arrow Tool catalog include the new "Autopneumatic Control," air-line filters,



lubricators, and regulators used separately and in combination. Get your copy from Arrow Tools Inc., 1900 S. Koster Ave., Chicago 23.
Circle Inform-A-Gram No. B58.

"To Bring You Up-To-Date on Airflex" covers the design, performance, and markets of Airflex pneumatic riveting and dimpling machines for such cold-flow operations as riveting, swaging, flaring, reducing, enlarging, and aircraft dimpling. Get your copy from Lemert Enineering Co., Inc., Airflex Div'n, 206 E. Jefferson, Plymouth, Ind., or —
Circle Inform-A-Gram No. B59.

"Iron Powder Electrodes and Their Application," a paper given before the American Welding Society, discusses the theory and advantages of these new electrodes. Procedure information, application of iron powder electrodes, physical properties, and operating characteristics are detailed and illustrated. The Lincoln Electric Co., Cleveland 17, Ohio.
Circle Inform-A-Gram No. B60.

The Hand Operated Di-Acro Press Brake which uses standard press brake dies, develops 8-tons pressure, and accurately forms and bends metal from 16-gauge steel to ¼" steel plate—is introduced in a folder from O'Neil-Irwin Mfg. Co., 626 Eighth Ave., Lake City, Minn.
Circle Inform-A-Gram No. B61.

Interference Supression Filters for use in screen rooms or on induction heating equipment or other equipment that may produce radio interference, are reviewed in combined catalog No. FSR from Filtron Co., Inc., Flushing, L. I., N. Y.
Circle Inform-A-Gram No. B62

Over 597 Oilite Standard Size Cores, bars, and plates are listed in 6-page Catalog CB 54-1, prepared by the Amplex Div'n of Chrysler Corp. Parts made from Oilite bearing material may be used to effect permanent repairs, in emergencies, or for experimental purposes. Write to Dep't 175, Chrysler Corp., Amplex-Div'n, Detroit 31, Mich., or—
Circle Inform-A-Gram No. B63.

The Leigh Carbide Scriber is a pocket-size instrument for marking hardened steel, plastics, ceramics, etc. The carbide points are removable for resharpening. For complete details get Bulletin 676 from Spring Specialty Co., 23 N. Fifth St., Maywood, Ill.
Circle Inform-A-Gram No. B64.

Both Sides of a Workpiece can be drilled, bored, faced, reamed, or threaded in three successive positions on New Britain Model 365 double-end automatic chucking machines. For complete specifications, contact The New Britain Machine Co., New Britain, Conn.
Circle Inform-A-Gram No. B65.

Solid Carbide Plug Gages manfactured by R. L. Schmitt Co., carbide tool specialists, are the subject of a recently published price list. Get your copy from R. L. Schmitt Co., Box 1082, Allen Park, Mich., or —
Circle Inform-A-Gram No. B66.

A Simple Chart in Bulletin 55-2 from Lewis Machine Co. makes it easy to select a wire straightening and cutting machine to meet your production requirements. Features of Model 2-C wire machines are described and 16 variations of this model are listed. The Lewis Machine Co., Dep't 6F, 3441 E. 76 St., Cleveland 27, Ohio.
Circle Inform-A-Gram No. B67.

5409

SHORT RUNS of PRECISION GEARS

Short runs of small, fine pitch, precision gears (gears up to 6" O.D. of the gear blank) carry high unit costs largely because of the top-heavy machine set-up time as compared to total production time. You can beat the machine set-up problem by routing small precision gear jobs to Hamilton Precision Gear Hobbers . . . for:

"Hamilton Precision Gear Hobbers feature independent selection of speed, feed, and indexing; reducing machine set-up time and offering a selection of cutting speeds and feeds to suit (exactly) the material being worked."

if you buy small quantities of precision gears, tell the man to "put your job on a Hamilton." You stand to profit two ways!

WANT FACTS ?

Write for Hamilton Bulletin No. 5409.
Address: The Hamilton Tool Company,
832 South Ninth Street,
Hamilton, Ohio

IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

CIRCLE INFORM-A-GRAM KEY NO. 1211

THE SECOND INDUSTRIAL REVOLUTION

Editor's note: We feel we are rendering a distinct service in calling your attention to the January 22nd issue of The Saturday Review, the magazine's 1955 annual business issue. Although, by the time you read this, that issue of The Saturday Review will have disappeared from the newsstands, the following review of the content should cause you to locate a copy if you missed seeing it a few weeks ago. E. W. P.

The Second Industrial Revolution, powered by atomic energy and controlled by automation, that will transform the American scene for business, labor and consumers is taking shape rapidly here even though it is not just around the corner, The Saturday Review reports in its annual business issue.

The problems and opportunities created for government, industry and labor by "Atoms & Automation" are analyzed by a group of authorities in the field who present a variety of viewpoints and conclusions.

A survey conducted by the Research Institute of America among the executives of more than 1000 U. S. firms disclosed that roughly one-third expect to see the first atomic application in their industry within the next ten years, and an even higher proportion look for extensive automation in their field within the same span of time.

Furthermore, some 16% see automation as a significant factor in their industries right now, The RIA survey reported.

Included in the January 22nd issue of The Saturday Review are the following articles:

1. The impact of atomic energy on modern civilization is discussed by author-economist Stuart Chase in "New Energy for a New Age," an article which analyzes how all civilizations have been shaped by their prime mover, whether manpower, steam or electricity.

2. Democracy, both political and economic, is confronted by vast new social challenges with the advent of atomic power and automation. These challenges and the need to safeguard the individual in their solution are discussed by former Assistant Secretary of State Adolf A. Berle, Jr., lawyer, diplomat and economist in an article discussing "The Democratic Future."

3. John I. Snyder, Jr., president of U. S. Industries, Inc., presents a detailed picture of the meaning and methods of the fully automatized factory, working without men, with machines providing both brain and muscle power. Mr. Snyder managed the first automatized factory in the United States.

4. The enormous possibilities and very real limitations of atomic energy as a source of industrial power for a power-hungry world are analyzed by E. V. Murphree, president of The Standard Oil Development Corp.

5. Behind the advent of automation lies the technological miracle of a mechanical mouse, a little metal creature whose myriad off-spring may do the work of thousands of men before very long. The story of the mouse and his sociological meaning is told by John Lear, author, historian and writer on economic matters.

6. Not only management, but labor has a tremendous stake in automation, for automation, unlike early labor-saving devices, can do the work of skilled as well

Never Confuse the No. 8 MARVEL with an ordinary Band Saw

...only the MARVEL is Universal

Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.
Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.
Only a No. 8 MARVEL can do all of these things: Snip-off a ¼" rod or cut-off an 18" x 18" cross section.
Rough to Size and Shape
Miter
Index
cut off and shape Structural Beams
Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.

"Rough Machine" to size and shape with minimun chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

Metal Cutting MARVEL SAWS
Better Machines-Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 1221

as unskilled workers. This potential nightmare of widespread technological unemployment is reported on by Nat Weinberg, research director for the United Automobile Workers.

7. The outstanding books published for businessmen during the past year are selected and commented on by Sumner Slichter, professor of economics at Harvard University.

8. A check-list of the latest important books in the field of atoms and automation, compiled by Saturday Review, is included in the issue.

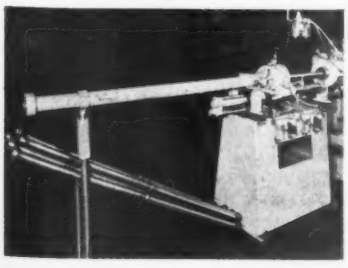
AIR-OPERATED STOCK FEED AND COLLET UNIT

Automatically feeding bar, hex or tubing stock into a machine is accurately performed by a new air stock feed and collet operating unit built by the Erickson Tool Company. It can feed stock for any mechanism, rotating or non-rotating, and is designed to operate with any type of collet equipment.

It consists of three main assemblies: stock tube, filler tubes, and stock tube support; air operated feed chuck and feed chuck base; and an Erickson heavy-duty, high rpm rotating air cylinder of "donut" design.

The unit can accommodate stock up to 2⅝" dia. and provides an adjustable feed length from 0 to 15". Its operation is safe and quiet, and is controlled entirely by one valve.

At the flick of the valve handle, the spindle collet opens and the feed chuck advances the stock to the preset length; the feed chuck then opens its jaws. Another flick closes the spindle collet on the stock and returns the feed chuck to its starting position where it closes its jaws on the stock to give double grip. This double grip resists "push-back" and provides an additional bearing, thus reducing shock deflection and whip. The feed cycle is performed with the spindle rotating at a great saving in cycle time.



The filler tube enclosing the stock is supported over its length by ball bearings in the stock tube. It rotates with the stock to prevent marring. The stock is supported over its entire length by the stock tube, rotating feed chuck and rotating air cylinder. This arrangement eliminates chatter, prevents whip, and increases machining accuracy.

Ruggedly designed of welded construction, both the tube support and the feed chuck base are easily adjusted for height at set-up. Standard stock tube lengths are 6′ and 12′, with special tubes as required. For complete information, write Erickson Tool Company, E. 23rd and Hamilton, Cleveland 14, Ohio.

Circle Inform-A-Gram No. D1.

EACH MACHINIST BECOMES A 5346

ONE MAN CREW

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THE HANDY HAMILTON PORTABLE ELEVATING TABLE

One man can lift, lower, and transport compact, heavy loads which, without Portelvator, would require the combined strength of three or more men.

Maintains materials at proper machine feeding level.

Speeds transfer of tools, dies, and fixtures between machine and storage.

Conserves worker time and worker brawn, your most expensive product component.

Reduces injuries to workmen, and damage to tools and materials due to manual handling.

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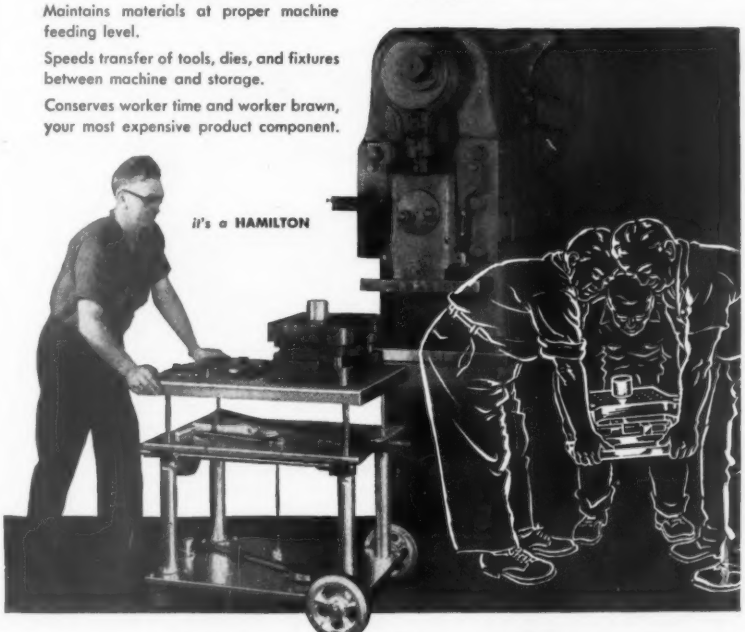

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IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

CIRCLE INFORM-A-GRAM KEY NO. 1231

. . . Template Holes, from page 109

several operations.

Form block makers customarily cut the hole to within 1/16″ of desired diameter with a fly-cutter. Remaining material then was removed with a sanding drum and a half-round file. But even after these precautions, which required 30 to 60 min/hole, the work often was inaccurate.

Form Block Maker John R. Pannell designed and developed the router guide that made precision cutting possible. He designed it to fit an improved screw-type guide head he built in 1952 for his Onsrud tilting arbor router.

The router guide's most unusual characteristic is that it rotates the form block in a circular pattern around the stationary router blade to make the lightening hole. Normally, of course, the fly-cutter moves and the form block remains stationary.

This reversal of customary procedure gives the new router guide its impressive accuracy, according to Designer Pannell. Measurements taken from the

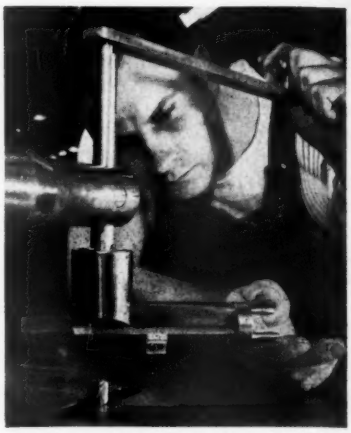


Photo courtesy Temco Aircraft Corp.

stationary router blade to a tapered point which rests in the template's pilot hole are much more accurate than those possible with a fly-cutter.

Basically, Pannell's attachment consists of these key members: a 9″ vertical shaft which is held by the screw-type guide head; a 13″ long crank attached horizontally to the top of the shaft, and a 6″ track attached horizontally to the bottom of the vertical shaft.

The tapered point travels along this track by means of a screw traverse. A 6″ scale on one side of the track is graduated in tenths-of-an-inch. A circular scale at one end of the track is graduated in thousandths-of-an-inch. Indicators on both of these scales move along with the tapered point when Pannell revolves two handles that actuate the screw traverse.

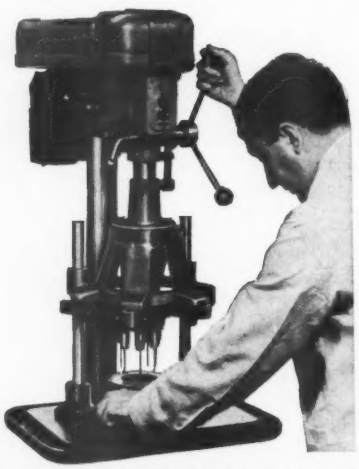
To set up for routing a hole with a 2″ radius, Pannell first lines up his tapered point with the 2″ marker on the 6″ scale. This means the point is precisely 2″ from the back side of the router blade.

If the radius required were .003 more than 2″, Pannell would make the 2″ adjustment on the large scale, then use the circular scale to add in the thousandths.

Once the tapered point is properly positioned, it is lowered into the pilot hole of the template to be routed, where it automatically centers.

Pannell then turns the crank, attached to the top of the vertical shaft. One counter-clockwise revolution of the crank revolves the template in a perfect circle over the router blade. The cut is so exact that no sanding is necessary.

Taps or drills over a million different hole combinations



The NEW

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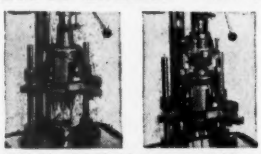

IT DRILLS — IT TAPS. Takes only a moment to convert. 1:1 drive ratio ideal for lead screw tapping.

FLEXIBLE SHAFT SPINDLES are positioned quickly, accurately even while unit is running.

FLEXIBLE SHAFTS run in either direction without unravelling, whip or vibration — can be removed in seconds.

- Exclusive flexible shaft drive spindle design makes it the most versatile, most easily adjusted head ever. It's just what the doctor ordered for stepping up production and slashing costs on an unlimited variety of small parts tapping and drilling. It's virtually a complete production line — all in one compact, lightweight, low-cost unit.
- Ingenious flex-shaft spindle design with quick adjustment feature on each spindle gives wider range of settings — cuts set-up time way down.
- The only head of its kind that taps or drills on any drill press without use of reversing motor.
- For horizontal or vertical tapping or drilling.
- Needs no special engineering — you put it to work on your jobs at once.
- Capacities up to 5/16″.
- Unconditionally guaranteed to do the job for which it's sold — you can't lose!

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TAPPING ATTACHMENTS • MULTIPLE HEADS • TAPPING MACHINES • INDEXING FIXTURES • TAP AND DRILL CHUCKS

CIRCLE INFORM-A-GRAM KEY NO. 1241

Ettco Tool Company, Brooklyn manufacturer of tapping and drilling equipment, has appointed **Arthur E. Stehle** as national Sales Manager. With the company since 1945, Mr. Stehle has held posts in the engineering, service, production, and sales departments.

◆

Kenneth Kelley has been appointed to the Sales Department of Ziv Steel & Wire Company's Toledo office.

◆

Size Control Company announces that **Arthur J. Vincent,** who has been selling Size Control gages and centerless lapping machines for eight years in another capacity, has been appointed Sales Representative in metropolitan New York and New Jersey.

◆

New Manager of the New York State territory for the The Henry G. Thompson & Son Company is **Robert H. Holton. E. J. Marinan** is now his Assistant in New York. Mr. Holton will continue in charge of his present Detroit-Cleveland territory.

◆

E. W. Bliss Company recently launched manufacturing operations at San Jose, Calif., and has now established sales offices in Burbank to supplement the West Coast division. **M. Frank Strauss** and **Donald C. Walker,** who have represented the company in Southern California for many years, join the company to man the Burbank office.

◆

Announcement of the appointment of **Chesley Somerton** as Assistant Sales Manager has been received from the Wales-Strippit Corporation, specialists in punching and notching. Previous to this appointment he was a Sales Engineer for Wales-Strippit of Canada, Ltd.

◆

George Bennethum, former Cleveland Representative, has been appointed Assistant Manager of tool steel sales for The Carpenter Steel Co.

◆

Elmes Engineering Division of American Steel Foundries has appointed **Gordon R. Porterfield** as District Representative of the New York Territory. Mr. Porterfield has a highly diversified background in the heavy machinery industry, including ten years in the hydraulic press field.

Raymond W. Wiehsner, formerly a design engineer for the Tabor Manufacturing Company has been appointed Sales Manager of the company, a Division of Turbo Machine Company of Lansdale, Pa. Mr. Wiehsner has been associated with Tabor for 42 years.

◆

William M. Smart has been appointed Sales Manager of the Congress Drives Division, Tann Corporation, in Detroit. Congress drives include pulleys, V-belts, couplings, pillow blocks, and flange mount bearings.

Bertrand J. Hansson was recently appointed as a Sales Representative for The Billings and Spencer Company of Hartford, manufacturers of drop forged wrenches and shop tools. He will headquarter in the company's Chicago Branch Office.

◆

Appointment of **David A. Wallace** as Sales Manager of Cincinnati Lathe and Tool Co. has been announced by G. C. Taaffe, President of the firm. Mr. Wallace joined the company in 1949 as a Salesman and was promoted to Assistant Sales Manager in 1951.

5407

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PRECISION

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to drill holes (.004" to 5/16") in all drillable materials, to the most exacting specifications and on the most relentless production schedules.

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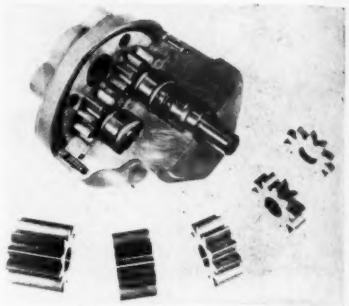
CIRCLE INFORM-A-GRAM KEY NO. 1251

First Powdered Alloy Steel Gears
Result of Joint Two-Year Project

The first successful application of the techniques of powder metallurgy to the production of high strength machine parts requiring the properties of solid alloy steel has been jointly announced by three companies. The trio cooperated in a two-year project to develop high strength alloy steel gears fabricated via the powdered metal process.

Vanadium-Alloys Steel Company, a producer of pre-alloyed steel powders since 1949, developed the 4650 steel powder, a pre-alloyed type made by water disintegration of molten metal.

Fabrication of the steel powder into gears with tensile strength exceeding 100,000 psi, C-30 particle hardness, and greater resistance to wear than previously used (solid) gears was the job of Keystone Carbon Company.



First Alloy Steel gears from powdered metal, and cutaway of Hydreco pump, first product to use them.

The third member of the team, Hydreco Division of New York Air Brake Company, carried out extensive tests of performance and durability, made the final application of the gear to its line of hydraulic pump equipment, and reports considerable savings in cost as well as superior characteristics for the powdered steel gears.

Keystone Carbon is presently producing the powdered alloy steel gears in 1½" pitch diameter with lengths ranging from ¼" to 1½". The outlook is bright with respect to producing other parts for Hydreco's equipment.

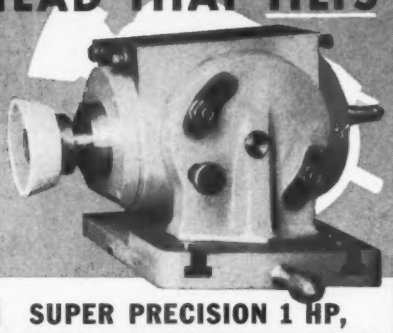
Field tests and accelerated life tests were carried on by Hydreco over a period of two years to determine the performance characteristics of the powdered steel gears relative to the known performance of the cut steel gears formerly used. After thousands of test hours, in the laboratory and in the field, the performance of the new gears was such that in the opinion of the engineers at Hydreco the gears were equal, if not superior, to the cut gears originally used.

The uniformity of one gear to another, the superior surface finish on the teeth, the resistance to wear and the very high strength, not to mention the cost reduction, were all factors which led Hydreco to approve the gears for production.

Any wear or scoring of the gear end faces is immediately reflected in loss of pump efficiency. Tests made under varying conditions of temperature, pressure, speed, pump running clearances and oil cleanliness indicated superior resistance to end face wear and scoring.

HERE'S A HEAD THAT TILTS

and Yours Will Nod, Too When You See What You Can Do With This One



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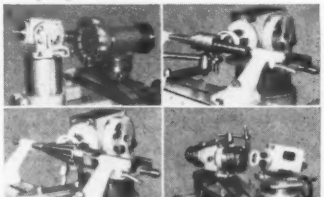
With Angular Adjustment In A Vertical Plane

Give this versatile head the nod and save time and money these seven ways:

1. You can use cup wheels for practically all clearance angles and thus produce a cutting edge on tools that lasts longer because it is stronger.
2. You can keep the tooth rest on the center line of the cutter for practically all grinding on centers or in the work head.
3. You can grind most cutters and reamers all over *with a single set-up* using the swivelling table and Pope tilting head.
4. You can read all clearance angles directly in degrees from the scale provided on the head. No more mistakes.
5. You can get the right clearance angle on such tough grinding jobs as slab mills, taper reamers, angular cutters and form tools.
6. You have one safe speed — 3600 RPM — for all wheels generally used on cutter grinders. Heat checking of cutters is virtually eliminated.
7. You have a head that's so easy to adjust and use it saves you time and money every time you grind a tool.



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No. 101

Specify POPE® PRECISION SPINDLES

POPE MACHINERY CORPORATION
Established 1920
361 RIVER STREET • HAVERHILL, MASSACHUSETTS

CIRCLE INFORM-A-GRAM KEY NO. 1261

The surface finish on the faces of the powdered steel gear teeth is important in a hydraulic pump application as the volumetric efficiency is dependent on the seal offered by the mating of the teeth of the two pump gears.

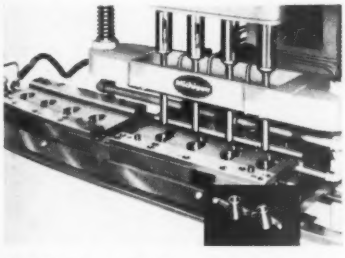
Performance characteristics of the new gears result from the properties of Vanadium's new pre-alloyed steel powder. The alloy content, for example, makes it possible to harden a thick section completely through, to provide a strong core as well as a hard surface.

Parts made from the pre-alloyed steel powder respond to heat treating in the same manner as parts made from bar stock having the same chemical analysis. This characteristic makes it possible to produce high tensile strength parts over a range of density. Parts molded from the new powder have good green strength, permitting automatic handling prior to sintering. The molded parts do not decrease in size beyond controllable limits during the sintering operation.

The successful culmination of the two-year development indicates that where close cooperation is achieved by the fabricator with the powder supplier and the end user, the horizons for powder metallurgy can be broadened.

Two-Station Automatic Shuttle Fixture

Finish reaming rocker arm shaft holes to between 20 and 30 micro inches in one pass, is



standard procedure on a new machine designed and built by the Michigan Drill Head Co.

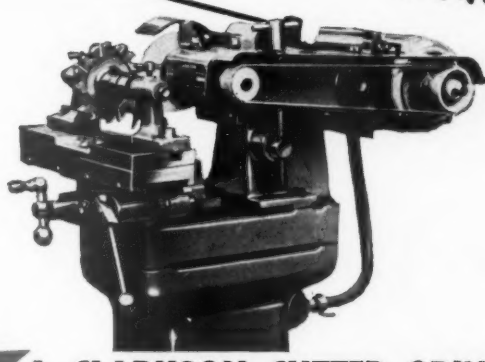
The distinctive feature in the design of this machine is the 2-station automatic shuttle fixture mounted on a standard Michigan Hydro 5. From the illustration it can be seen that four rocker arms can be installed in each station of the fixture. In its operation, for example, station 1, at the left, will be loaded while the rocker arms located in station 2, at the right, are being reamed. When the reaming is completed, the parts are automatically ejected, down a rear chute, into tote pans. Both stations then shuttle to the right so that while those arms in station 1 are being reamed, station 2 is reloaded.

The nesting plates which hold the arms are interchangeable so that any size or shape of rocker arm will fit in the fixture.

A pilot on the reamer picks up the part location prior to the actual sizing by the reamer.

Experience shows that this method of machining greatly increases tool life, downtime is kept to a minimum, and maintenance is greatly reduced. But, more important, this method eliminates the need for further superfinishing.

$689 will keep your cutters Sharp!



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The CLARKSON cutter grinder, with its ease and simplicity of setting and rapidity of operation, will reduce "down time" to a matter of minutes. Handles all sizes of tools from 1/16" diameter end mills to large side and face cutters, including slot drills, reamers, tee slot cutters, face mills, cylindrical cutters, etc. Complete demonstration on installation

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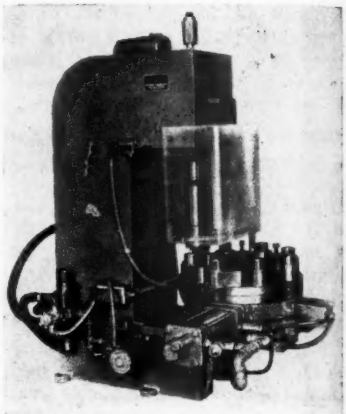
CIRCLE INFORM-A-GRAM KEY NO. 1271

STEERING KNUCKLE ASSEMBLY INCREASED 50%

Tooling and mounting an 8-station, 15" dia. index table on a 5½-ton press provided a machine setup for pressing together two parts of an automobile steering knuckle. This setup increased production from 1,200 pcs/hr to more than 1,800.

The rotary table and press are built by Air-Hydraulics, Inc. and in combining these into one machine with an electrical circuit to synchronize their action, a fully automatic operation is obtained. The press can be operated when the table is in a locked position, and the table indexes only on the press return stroke.

In production, the operator places the workpieces on the 1st-station fixture in front of the transparent guard where there is no danger of hand injury. The parts are then indexed into position and pressed together. The assembly is unloaded by a mechanical hand and chuted into a container.



The numerous adjustments controlling ram speed and pressure plus a constant pressure at any point in the stroke have eliminated previous difficulties caused by slight variations in stock thickness and other factors. Cushioned stop and positive lock on the table prevent damage to the assembly or tooling.

CIRCLE INFORM-A-GRAM KEY NO. 1281

4-SPINDLE SEMI-AUTOMATIC DUPLICATOR

A newly designed 4-spindle duplicator permits one pair of identical parts to be processed by one pair of cutters and fixtures, while the other pair perform a different operation on two other pieces.

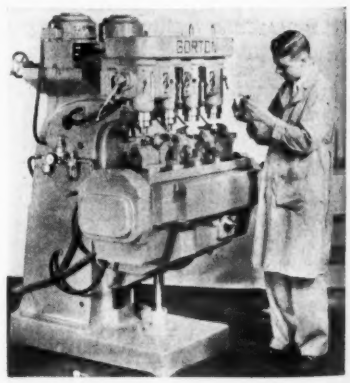


Fig. 1. New Gorton 4-spindle rotary duplicator for profiling two locking lug recesses in two gear blanks automatically while operator unloads and reloads two other fixtures for the same operation on two other blanks.

This machine is a high-production, 4-spindle duplicator built by George Gorton Machine Co. and is shown in Figure 1, where two heads are in operating position while the other two are idle during unloading, gaging, and reloading.

The unique design causes the heads and rotating fixtures to operate in pairs, each pair of fixtures being governed by a separate master. Two masters, one for each pair of fixtures, are located within the table assembly.

In the application illustrated, Figure 2, all pieces were identical—operation was to mill two locking lug recesses in bevel gear blanks at a rate of 100,000 pieces per month. Recesses were 5/32" deep and 13/64" wide. Material is SAE 4615 cold drawn, 180 to 210 Brinell material.

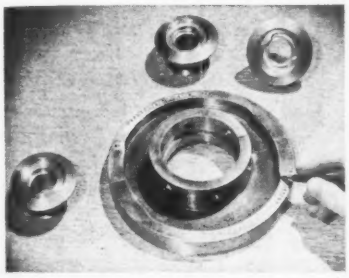


Fig. 2. Master cam which guides table movement during cutting, together with two finished blanks and one blank before profiling.

After cutter spindles have been set for the required cutting depth, fixtures holding the work by air-operated clamps rotate and move in and out from column face, guided by the concealed masters. In this way, the two recesses are milled to exact shape and size in one pass.

All movements are protected by electrical interlocks. For example, one pair of spindles and holding fixtures will not operate until the other spindles are raised above the work.

Multiple spindle duplicators such as this will profile (continuous or interrupted) internal or external surfaces, groove and rout piece parts at a high production rate with exceptional repetitive accuracy. Variations of this type of machine can be designed with more spindles and more range, with or without variable down feed, all depending upon individual requirements.

For further information write George Gorton Machine Co., 1321-NN Racine Street, Racine, Wisconsin. **Circle No. D2.**

PLEISTOCENE REPUBLICAN?

An interesting paleontological discovery was unearthed recently at an 86′ depth by workmen excavating at the Harvey Aluminum mill in Torrance, California.

According to Dr. Theodore Downs, Curator of Vertebrate Paleontology at the Los Angeles County Museum, the specimen is believed to be from a Columbian elephant or mammoth of the Pleistocene period, 20,000 to 40,000 years old. The mammoth, which reached a height of nearly fourteen feet, inhabited the temperature parts of the northern world during the Ice Age.

The excavation, a part of Harvey's current expansion program, eventually will reach a depth of 116′ and be utilized in the solution heat treatment process as a quenching tank for heavy press aluminum extrusions.

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RAISING THE CURTAIN ON THE NEW

45 TON POWER PRESS

A NEW MODERN PRESS BUILT FOR TODAY'S REQUIREMENTS

★ BETTER PARTS
★ GREATER SPEED
★ FASTER SET-UPS
★ EASY ACCESSIBILITY
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THE ONLY 45 TON OPEN BACK INCLINABLE PRESS WITH BUILT-IN STEEL TIE RODS AND 4" DIAMETER CRANKSHAFT AT MAIN BEARINGS

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The New 45 Press-Rite Power Press is exclusive among presses because of the many heavy duty design features engineered into it. Equipped with heavy Unicast frame and built-in steel tie rods, there is less deflection. This means longer runs between die grinds . . . increased die life . . . better parts . . . more production with fewer rejects. Greater shut height. Full Vee Gibs easily adjustable from both sides for perfect alignment. Automatic cam actuated brake. Cam operated single stroke safety brake. Anti-friction flywheel bearings.

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CIRCLE INFORM-A-GRAM KEY NO. 1291

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Now, with new Spra-Kool, you can quickly and economically apply spray-coolant to all types of dry grinding and polishing jobs. You'll get a simple, dependable system that *your operators will like to use* . . . one that you can quickly and easily apply to a wide range of work.

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2 **DEPENDABLE, HIGHLY EFFICIENT**—simple valve and nozzle settings provide a steady, uniform jet spray to tools and work — unaffected by varying air pressure.

3 **ASSURES BETTER FINISHES, INCREASED OUTPUT**—cooling combined with forced jet penetration prevents damage to work, increases wheel life, assures better finish and increased output.

4 **INEXPENSIVE, COMPLETELY ADAPTABLE**—4-6 hours continuous operation with one gallon of coolant. Compact unit includes coolant container, all necessary fittings, hose and tubing for quick setup on any make of machine.

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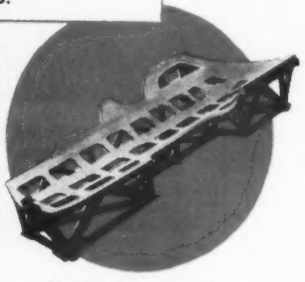

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HANNIFIN HAS IT!

The BIGGEST improvement in cylinder design in the last 50 years!

EVERY ENGINEER will want engineering data on these two new lines of HANNIFIN cylinders

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BULLETIN 113

Hydraulic Cylinders 2000 p.s.i.—3000 p.s.i. (non-shock)

BULLETIN 213

Fluid Power Cylinders 200 p.s.i. (air or oil)

HANNIFIN

Hannifin Corporation, 563 S. Wolf Road, Des Plaines, Illinois

Air and Hydraulic Cylinders • Presses • Air Control Valves

CIRCLE INFORM-A-GRAM KEY NO. 1304

... GM Develops, from page 107

perimental stage. Both Chevrolet and Pontiac divisions now have production installations.

The process has been used by Pontiac in coating exhaust valves and is now being developed under license agreements by Thompson Products, Inc., and Rich Manufacturing Corporation.

Successful use of Aldip on poppet valves, the report indicated, points the way to possible applications in turbine engine parts and other moving engine compartments that operate under conditions conducive to corrosion and oxidation.

Cycling Counter Records Basic Measurement

A five-bank Digital Cycling Counter suitable for counting events, measuring frequencies, determining rpm, and other similar basic measurement applications, has been added to the line

of instruments manufactured by Brush Electronics Co., 3405 Perkins Ave., Cleveland 14, Ohio.

The counter equipment consists of an amplifier at the input and a shaping circuit for converting input information into trigger pulses suitable for driving high speed electronic counters. A gating circuit between the trigger and the counter controls the flow of information into the counting assembly, permitting counting over a precise time interval supplied from an internal time base generator. Dividers reduce the intervals to 0.01, 0.10, and 1.00 sec, or on special order to 0 10.0 sec.

By proper choice of time intervals the number of events per sec, frequency in cycles per sec, or speed in rpm can be obtained. Speeds as high as 100,000 counts per sec are possible.

An accessory device permits the presetting of one or more counts, making it possible to use the counter as a control device in which frequency or speed may be controlled to very close limits. **Inform-A-Gram Key No. D4.**

Easy To Use Floating ADJUSTABLE REAMERS

Two types are available: Type S for standard reaming and Type SL for blind hole reaming.

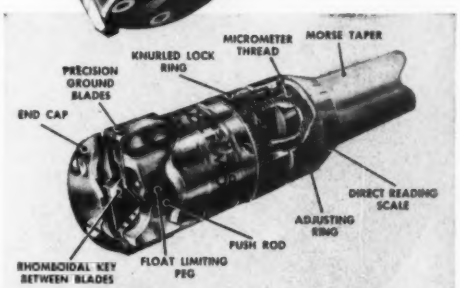
Reamer sizes and range: from ¾" to 4".

Wickman-Brown Floating Reamers with micrometer adjustment assure absolute accuracy, complete concentricity and superfine finishes on standard and blind hole reaming operations. Each reamer has a permanent positive float that is designed for maximum effectiveness throughout the full range of the reamer. Optimum float is predetermined in manufacture and requires no adjustment.

The simple adjustability of Wickman-Brown reamers results in considerable direct labor economy for the user. Adjustment to desired seting requires only the skill, effort and time needed to set a micrometer—no keys or special tools are required. Blades may be sharpened in usual manner without affecting micrometer readings.

FEATURES

- Fully Floating Blades
- Blades may be renewed
- Micrometer type setting
- No special tools required for setting
- No gears or springs
- Positive and constant float
- Operates rotating or stationary



THE Wickman MANUFACTURING CO.
10329 CAPITAL AVENUE
(OAK PARK)
DETROIT 37, MICHIGAN

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Why SCHNORR Disc Springs?

BECAUSE

1. Unlimited life within borders of permissible loads.
2. No creeping, initial settling or gradual fatigue.
3. Axial center pressure.
4. Exact adjustment to the desired pressure.
5. Small constructional height, large deflection.
6. Large inherent damping.
7. Large impact damping especially with multiple stacking.
8. Excellent space disposition.
9. Spring pressure, Spring length and Spring deflection can be easily determined for the same Spring size or can be changed by lengthening or shortening of the Spring columns or by multiple stacking. In special cases the character line can be made to divert from its usual straight form by diversified stacking.
10. Most spring sizes available from stock.

For Descriptive Literature Write KARL A. NEISE, Dept. TP
404 Fourth Avenue, New York 16, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1312

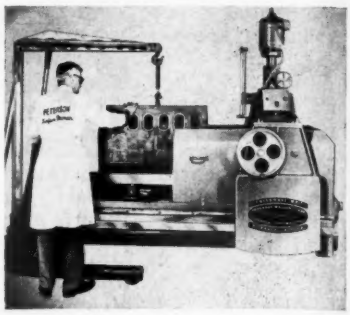
NEW UNIVERSAL AUTOMATIC WET GRINDER

A revolutionary new wet grinder designed for fast, efficient, accurate grinding and finishing of all types of metal and alloys has been developed by the Peterson Welding Labs., Inc. It will accommodate parts from the smallest sizes to workpieces 64" long, 16" wide, and 24" high.

Designed for easy loading, quick set up and alignment, full vision grinding, and fully automatic operation, it features the use of a 5" faced, 16" grinding wheel and a radically new cooling-flushing system.

It is capable of making a 0.010" cut in cast iron in a single pass, and yet develop a smooth finish of 30-80 rms doing so.

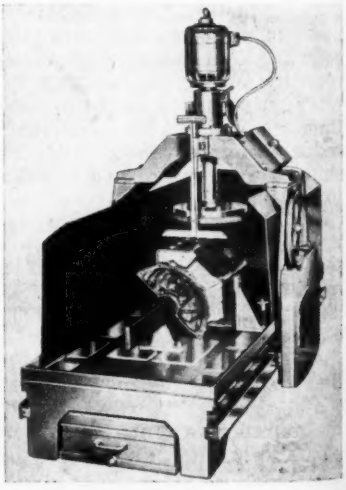
The grinder permits large workpieces to be loaded straight down from an overhead hoist or crane. Large work is positioned by resting it directly on a horizontal locating rail, while smaller work is positioned on a worktable pre-set on this same rail.



Since the machine affords a full view of the work at all times, the operator can make a quick visual inspection at any point in the operation. With manual feed control, he can make a fast test cut at a low setting, back up and inspect the surface, then reset for .001" to .010" as needed, and complete the job with one pass.

Probably the most revolutionary single feature of the new grinder is its unique centrifugal-force-flush coolant system. With this system, coolant is forced, under pressure, down through the hollow shaft of the spindle motor and on down through a hollow spindle and over a baffle which distributes it out in all directions over the working surface. This "inside-out" action results in thorough flushing and super-cooling and permits the use of the large 5" faced, flat-dressed, 16" grinding wheel.

A new catalog sheet fully describing the new Peterson Wet Grinder and giving all specifications is available direct from Peterson Welding Labs. Inc., 1423 Virginia Ave., Kansas City 6, Missouri. **Circle No. D5.**



Now Hardened Key Ways in Buck AIR CHUCKS

New Standard Feature Added to .001" Precision Ajust-Tru Chucks

Longer wear, longer accuracy — thanks to hardened key ways — is now added to other unique features of Buck Air Chucks. *At no extra cost!*

Now, more than ever, you'll want to consider *all* of the ways the Buck can save you money.

Guaranteed .001" precision.

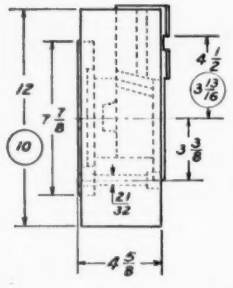
Jaws can be machined in the tool room, saving the time-wasting trial and error method *and down time* of fitting on the chucking machines.

Hardened jaws can be used for all operations with the Buck, and jobs run intermittently *without the need to re-true the jaws* for each set up.

Final accuracy adjustments can be made under full air pressure. And for safety, the Buck keeps its gripping power should the air line break.

6", 8", 10" and 12" sizes — 2 or 3 jaws — NO PRICE PREMIUM.

For long accuracy and savings never before possible with an air chuck — get a Buck. Send for complete details today.



Principal dimensions on the 10" and 12" chuck mounted to an A1-8" American Standard Spindle Nose.

CIRCLED DIMENSIONS FOR 10" DIAMETER CHUCK.

Buck AJUST-TRU CHUCKS

The Buck Ajust-Tru principle is a unique chuck development.

Jaws grip work like any other scroll or air chuck. After work is gripped opposed screws near the back of the chuck are used to move the chuck on the adapter to bring work to dead true alignment. No further adjustment needed to chuck duplicate parts.

On hand-operated chucks jaws always come back to within .0005" — on air chucks to within .001".

Buck TOOL CO.

418 SCHIPPERS LANE

KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1321

HAVE YOU A DAUGHTER HEADING FOR COLLEGE?

A shortage of technically-trained American women today was given as one of the reasons why the United States is losing its scientific manpower advantage to the Soviet Union.

Dr. John T. Rettaliata, president of Illinois Institute of Technology, said that education of women in engineering has been progressing at a "snail's pace" when compared with Russia, where an estimated 25% of the engineers are women.

In this country, less than 1% of the approximately 500,000 engineers are females, according to the Illinois Tech president, who was one of the principal speakers at last month's Military-Industrial conference on technical manpower.

The number of Russian engineers of both sexes is estimated at about 100,000 fewer than the American total, but, Dr. Rettaliata added, in the last four years the Soviet Union has graduated about 154,000 engineers, compared with only 116,000 here.

Last year's engineering graduates from American colleges and universities were put at only about 20,000 against 54,000 for the Russian institutions.

Commenting on women's opportunities in technical occupations, Dr. Rettaliata said: "The scope and variety of work offered in engineering is almost limitless. There is an engineering position suited to almost every temperament, talent, and taste.

"Members of the Society of Women Engineers, although relatively few in numbers, already are working in many fields, including mechanical, electrical, civil, and chemical engineering, as well as in research and design."

He pointed out that women pioneers in the profession have "broken the ice" in industry, and many corporations, particularly the larger ones, are employing women engineers in a variety of capacities in which they are trained.

"But the number engaged in engineering activities is far from enough," he warned. "Many, many more will be needed to replenish the ranks of the profession to the point of safety."

He said that most young women probably are not aware that about 75% of all engineers are in administration, management, design, research, and development, and that the minority remainder are employed in manufacturing, production, construction, or other operating functions.

For those young women who believe they have talents for engineering, Dr. Rettaliata explained that there are significant indications of aptitude.

In school work, he said, the potential engineer usually shows interest and skill in mathematics and general science. There also must be an ability to visualize and a preference for scientific or mechanical work.

"Any woman possessing reasonable intelligence and a liking for the work can master the training, do the job, and not lose the identity of her sex in the process," Dr. Rettaliata concluded.

Quick-Change . . .

Manchester Cut-Off Tool . . .

● New P.D.Q. "Manchester" cut-off tool offers *15 SECOND* tool change. Loosen only one screw to change carbide insert. "V" design on support blade and insert makes this tool self-centering and highly accurate. Adjustable rear stop provides positive insert backing and quick adjustment after insert is re-ground.

Tools are available for turret lathes, engine lathes, automatics and cut-off machines... Write for literature and specifications covering *ALL* the new "Manchester" tool features.

PDQ

PORTAGE Double-Quick TOOL CO.

1046 SWEITZER AVENUE • AKRON 11, OHIO

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WITH NOBLE & STANTON
Standards
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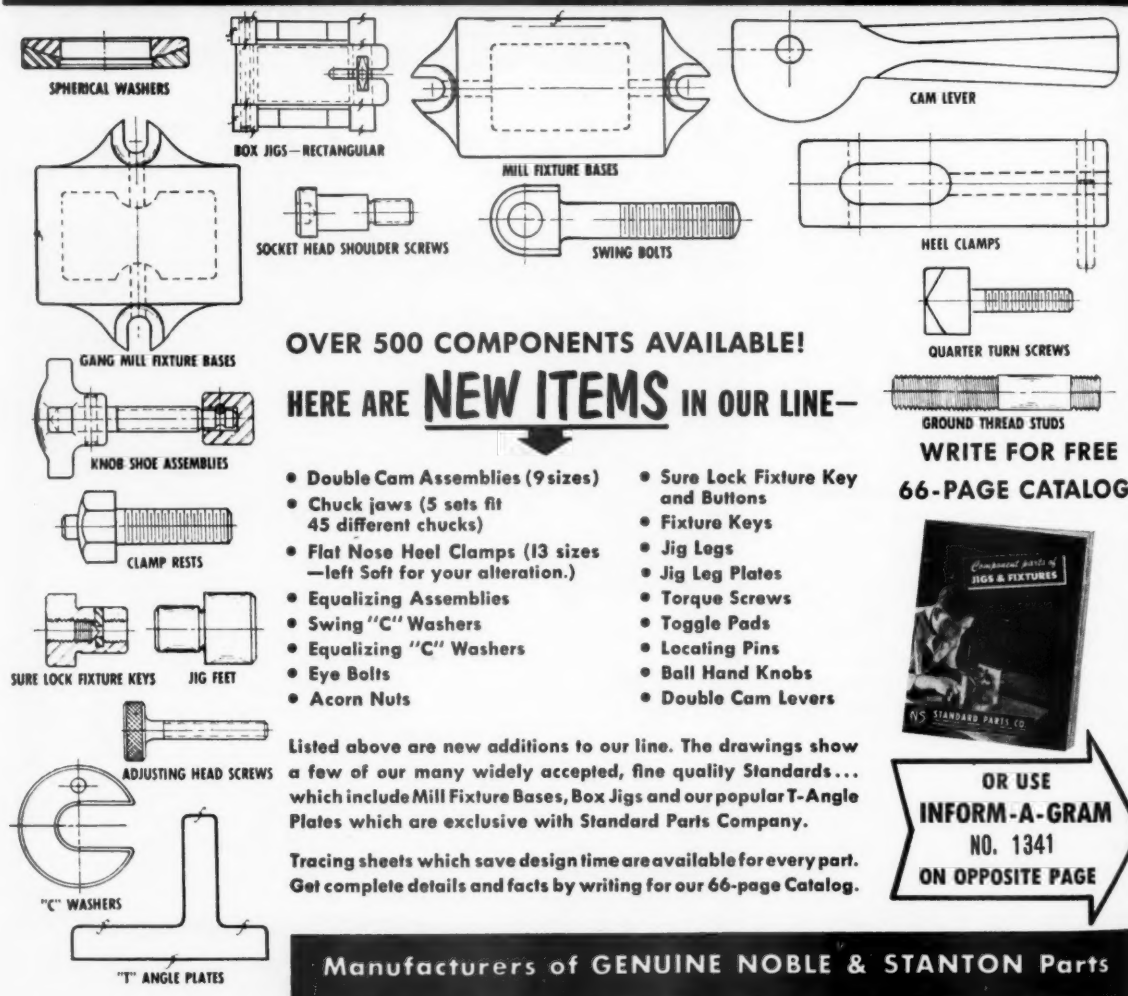
CUT Man-Hours—CUT Design Time—CUT Toolroom Costs



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- Double Cam Assemblies (9 sizes)
- Chuck jaws (5 sets fit 45 different chucks)
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- Jig Legs
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- Torque Screws
- Toggle Pads
- Locating Pins
- Ball Hand Knobs
- Double Cam Levers

Listed above are new additions to our line. The drawings show a few of our many widely accepted, fine quality Standards... which include Mill Fixture Bases, Box Jigs and our popular T-Angle Plates which are exclusive with Standard Parts Company.

Tracing sheets which save design time are available for every part. Get complete details and facts by writing for our 66-page Catalog.

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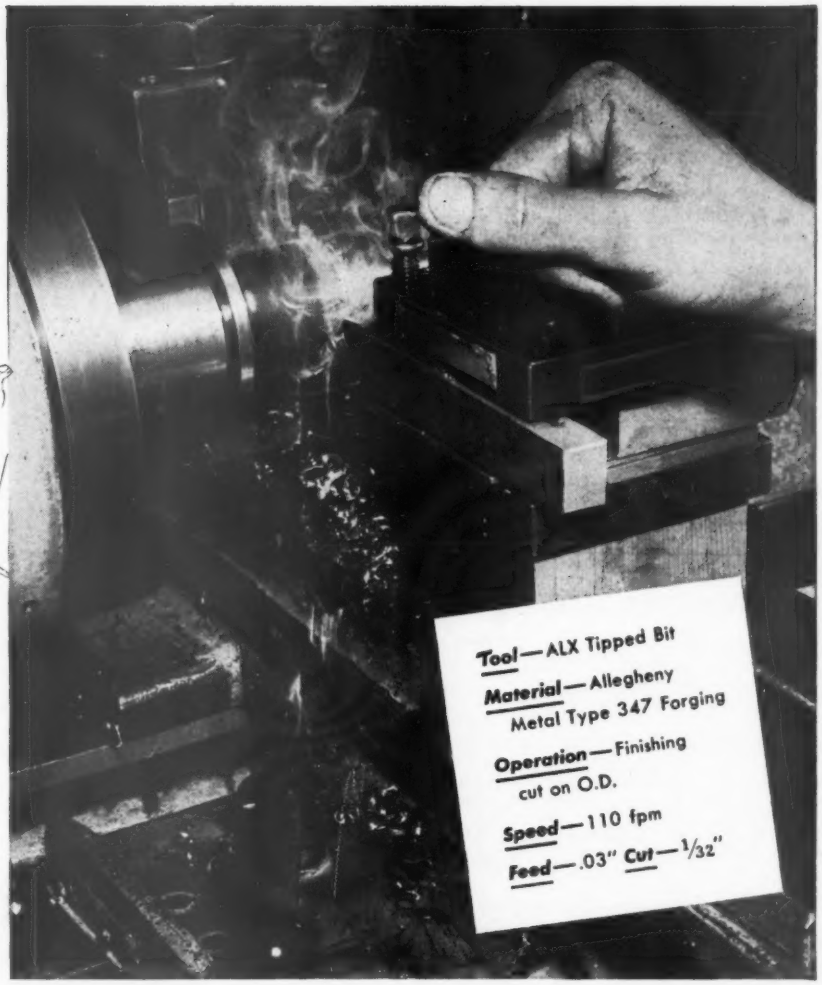

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ALX is a cast-to-shape, non-ferrous, cobalt-base alloy containing chromium, tungsten, carbon, and boron. The as-cast hardness of 60-62 Rockwell C obviates later heat treatment. Tools stay sharp at accelerated speeds and higher temperatures. Speed range is above that of high-speed steel, but lower than with carbide. At such intermediate speeds, the superior performance of ALX results from toughness, red-hardness, edge-strength, and abrasion-resistance values combined.

An Allegheny Ludlum tool engineer can quickly point out the strategic spots to tool up with ALX. For this service, call A-L. ● *Allegheny Ludlum Steel Corp., Forging & Casting Division, Wanda & Jarvis Aves., Detroit 20, Mich.*

For complete **MODERN** Tooling, call

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W&D 5441

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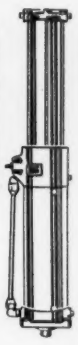

Air-Draulic Cylinder with Flange Mounting at Rod End

5 STANDARD MOUNTING TYPES

Standard bores from 3" to 8". Any stroke to 5 feet. For air pressures to 150 psi.

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- Air and Hydraulic Presses — Catalog 51
- Collet Grip Tube Fittings — Catalog 200-5
- Hydraulic Control Valves — Catalog 200-4
- Hydraulic Cylinders — Catalog 200-2; Also 200-3
- Hydraulic Power Units — Catalog 200-1
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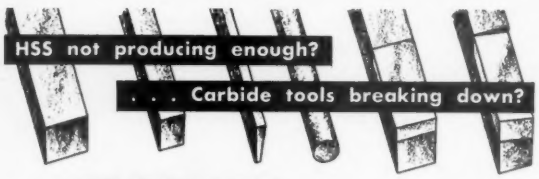

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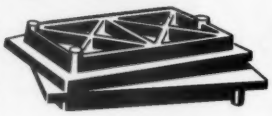

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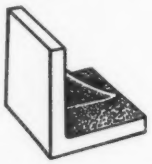

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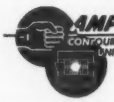

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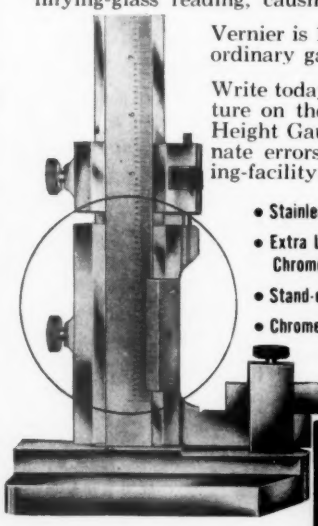

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CIRCLE INFORM-A-GRAM KEY NO. 1364

30-Year-Old Planer Modernized For Carbide Tooling

Fig. 1. 30-year-old heavy-duty openside planer after complete modernization. Table speed is increased 50% through installation of non-metallic wear strips, automatic forced feed lubrication to table rack worm shaft, and table ways.

Taking full advantage of the capabilities of carbide cutting tools is a problem in many plants where machine tools 25 to 30 years old are still in use.

One solution is the case of a 30-year-old planer recently modernized by the Simmons Machine Tool Corporation. The planer was a 5′ x 5′ x 20′ openside job which had seen some quite rough service in

. . . *Continued on page 141*

Fig. 2. New electric feed and rapid traverse to rail and side heads replaces old friction feed. Feed box can be seen on right end of rail. Rail heads and rail have one-shot lubrication system, and rail heads are equipped with air-operated tool lifters.

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This is a tremendous advantage to all fabricators of this material. The presence of the oxide not only made the beryllium-copper strip more difficult to handle, but frequently raised the cost of fabrication. For example, with this new "clean" beryllium-copper strip, die wear was reduced at one manufacturer's plant by 42%—permitting a savings to the manufacturer of $3.50 per thousand.

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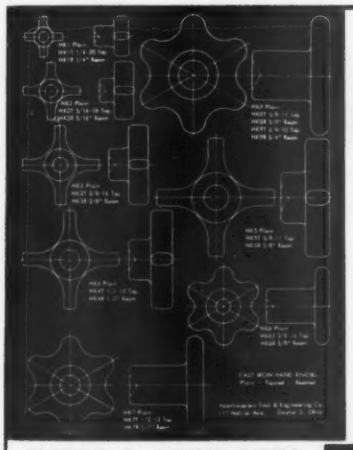

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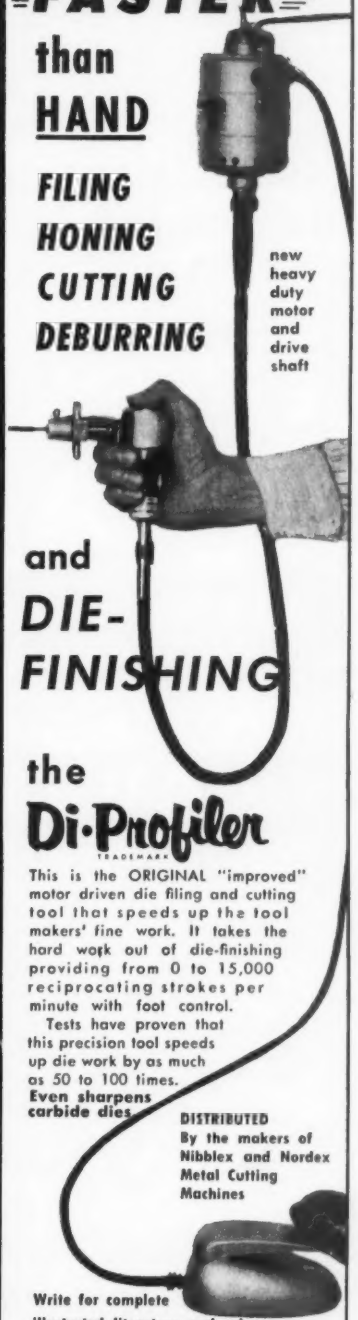

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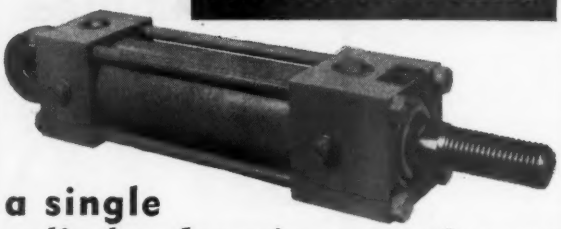

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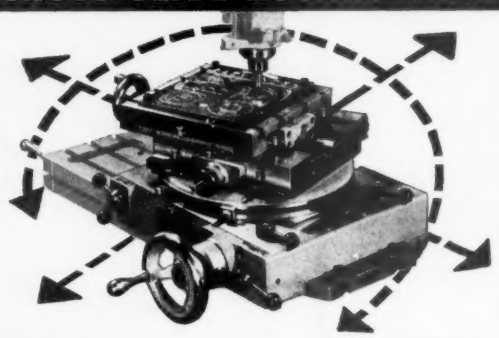

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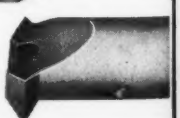

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. . . 30-Year Old Planer, from page 137

its 30 years use. It was slow, inaccurate, and dangerous to work with and never did have the power for carbide tooling and even lacked the power for regular tooling.

In modernizing this machine the table speed was increased 50% by the installation of non-metallic wear strips, and automatic forced feed

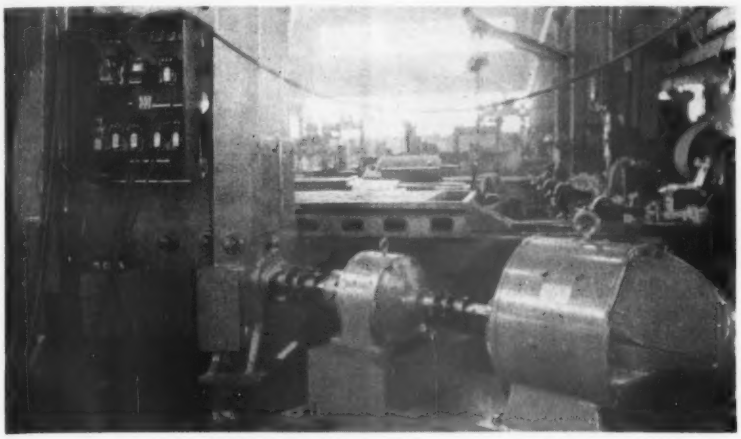

Fig. 3. In place of the old belt drive, this heavy-duty variable voltage motor and speed reducer unit is coupled directly to the worm shaft. New drive is safer for operator, since dangerous arrangement of pulleys and gears along side housing is eliminated.

lubrication to the table rack and worm shaft, and to the table ways. The old flat belt was replaced by a variable voltage motor with a gear reduction unit coupled directly to the worm shaft. Thus pulleys and gears along the housing were eliminated, allowing more room and greater safety for the operator.

The old friction feed was replaced by an electric feed and rapid traverse to the rail and side heads. This is a compact unit, mounted directly on the rail and eliminates any vertical rack or shafts. Rail heads are equipped with an air-operated tool lifter. Heads and rail are lubricated with a one-shot feed lubrication system.

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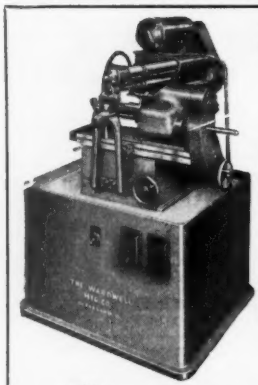

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"608" Chrome Carbide Aids High Temperature Evaluation

Recent-on-the-job tests of grade 608 chrome carbide, developed three years ago by Carboloy Department of General Electric Company, Detroit, indicate it may be the structural material answer for testing devices used in evaluating high-temperature metals.

The chrome carbide, according to engineering reports, is proving to be an excellent structural material for load applying members and sample grips employed in high-temperature transverse rupture and tensile stress rupture testing, for anvil and Brale extensions in high-temperature hardness testing, and as Brinell balls in elevated temperatures hardness evaluations.

Among the bottlenecks in evaluating high-temperature materials, Carboloy engineers say, is the unavailability of adequate materials for constructing testing devices to withstand very high temperatures required for such evaluation.

They point out that an ideal material for such tests must have strength at elevated temperatures, resistance to oxidation, stability to structural changes and high creep resistance.

Most materials rapidly decrease in strength when temperatures go over 1500°F, have low creep resistance at these higher temperatures, and as temperatures increase over 1500°F, rapidly decrease in oxidation resistance. Ceramic materials are generally very brittle and are therefore poor in supporting bending loads.

Tests with chrome carbide 608 as a structural material indicate it has good strength at temperatures as high as 1500°F, resists creep and deformation at temperatures of 1800°F or higher, and is very resistant to oxidation at 1800°F.

The hardness of chrome carbide 608 is 89 Rockwell A at room temperature, and 76 Rockwell A at 1500°F. Its transverse rupture strength is 100,000 psi at room temperature, 120,000 psi at 1500° F, and 100,000 psi at 1800°F. The material's gain in weight at 1800° F in 24 hours in static air is 7 mgs psi. Its coefficient of thermal expansion is closer to steel than other cemented carbides — 4.9 x 10^{-6} in/in°F over the range of 68 to 248°F.

The combination of high temperature strength and oxidation resistance found in grade 608 makes the material increasingly useful in the high temperature testing field.

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Save Your Magnetic Chucks
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ADJUSTABLE ROD GUARD
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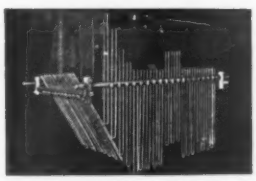

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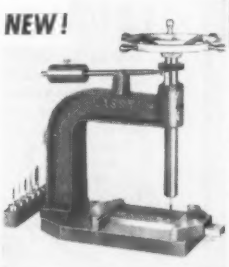

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With exclusive features sets new standards for accuracy, time and taps saved. Capacity #0 to 5/8".

Free 6 page circular

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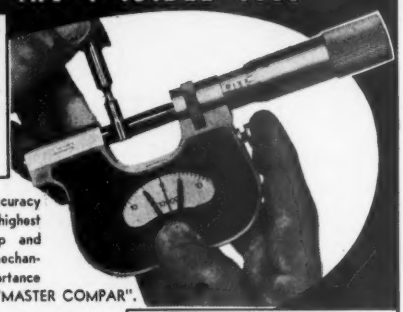
INDICATING MICROMETER COMPARATOR

has the VISIBLE feel

No Arguments as to correctness of reading due to "feel". Use it as Comparator, Master Micrometer, Go & No Go Gage. 1" Range reading in 1/10,000"



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Also Available in LARGER SIZES

A RIGHT HAND TOOL

Release button for movable Anvil on RIGHT Hand side enables you to hold tool the conventional way.

NEW— Resetting to Zero in 5 seconds

Quick adjustable tolerance hands.

Heavy TUNGSTEN CARBIDE Anvils will actually measure Out-of-Roundness, Ovalness & Taper.

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WORLD'S HARDEST METAL

IMPROVED QUALITY

Additional refinements and improvements in our process have added still longer life to the wearing edges of Talide tools, dies and wear resistant parts. The result is a carbide having a new, unique grain structure with harder and tougher properties than previous grades. Laboratory tests reveal our improved grades possess 25% greater strength and rigidity. Service life per grind up to 50% longer than previous grades has been proven in grueling field tests.

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HOT PRESSED AND SINTERED CARBIDES · VACUUM METALS

HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS

OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

CIRCLE INFORM-A-GRAM KEY NO. 1442

. . . Aluminum Coated Steels, from page 66

this weld may satisfy moderate tensile requirements, it might separate under conditions of vibration or stress.

The same procedures given for spot welding hold equally true in the seam welding of aluminum coated materials. It is highly recommended[1] that seam welding be done completely under water, or with a continuous stream of water on both the upper and lower electrodes. This practice will minimize excessive pick up of the aluminum coating by the rollers. As with spot welding electrodes, the rollers employed for seam welding must be periodically cleaned to remove contamination. Seam welders with double knurl drive have proved satisfactory; the knurled pinions "doctoring" the contact edges of the rollers. This permits, in many instances, six to eight hours operation without roller change.

Due to the excellent surface appearance of aluminized steel, there are but few applications where either painting or finishing is performed. If the product does require a painted surface, a preliminary operation of bonderizing is recommended to obtain maximum paint adherence and life of coating. Where it is essential to apply a paint finish without the intermediate step of bonderizing, any grease or oil must be removed. In some instances, aluminized steel may be buffed and lacquered, as is exemplified by the gas fired zone heater cabinet of Figure 6. This type of finish will improve light reflective qualities and is often used for decorative effects.

References

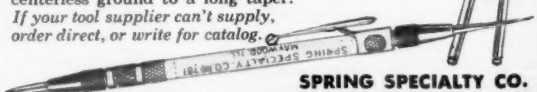
1. "Armco Aluminized Steel", 1950 ed., Armco Steel Corp., Middletown, Ohio.
2. "Use the Right Process for Coating Steel with Aluminum", Steel, Aug. 3 and Aug. 10, 1953.
3. "Aluminum Coating of Steel—A Comparison of Various Processes", P. T. Stroup and G. A. Purdy, Metal Progress, Jan. 1950.
4. "Hot Dipped Aluminum Coatings on Steel", B. P. Finkbone, Metals Handbook, 1948 ed., pp 704-705, American Society for Metals, Cleveland, Ohio.
5. "Resistance Welding Manual", 1948 ed., Resistance Welders Manufacturing Association, Philadelphia, Pa.
6. "Aluminum in Iron and Steel", S. L. Chase and K. R. Van Horn, 1953 ed., John Wiley & Sons, Inc., New York City.

No. 676 SINGLE POINT $1.50

LEIGH Carbide SCRIBERS

Marks hardened steel, ceramics, plastics, gems, glass, etc. Polished aluminum body. Black-finish steel screw collets hold the points, easy to reverse for safety or adjust for length. Carbide point is ¾" diameter carbide rod approximately ½" long, copper-brazed into steel, ground to a point, and hand-polished, CAN BE RESHARPENED MANY TIMES. Steel point is hardened, and centerless ground to a long taper.

If your tool supplier can't supply, order direct, or write for catalog.



No. 787 DOUBLE POINT $2.50

SPRING SPECIALTY CO.
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LANG Tool and Die Manufacturing Company, Glendale, California, use Cerromatrix to anchor small punches in high-production lamination dies. They guarantee these dies for 2,000,000 blanks minimum.
Punches are held vertically by cap screws and mounted in Cerromatrix. Very small punches are held by circular washers outside and inside of punch, located in a 1/16" groove ground in the punch. All small punches are guided through a fixed stripper with Nitrided inserts.
At least 1/3 of the length of the punches is held in Cerromatrix. The photograph shows a die for rotor and stator blanks. It runs 135 strokes per minute. Eighty to eighty-five thousand blanks are obtained per sharpening of die. Send for literature.

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TAPPING MACHINES
BUILT FOR SPECIFIC PRODUCTION JOBS

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- And Many Other Worthwhile Features

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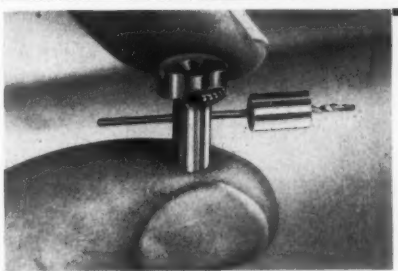

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Special Holes
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No change in price or delivery for metric and special hole sizes in STANDARD MICRO DRILL GUIDE RANGE OF #80 to 3/32" in listed body sizes.

PLUS . . .

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Commonly recurring sizes are stocked finished. Also complete stock of 75 semi-finished standard body styles and sizes—ready for completion.

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No counter bore . . . diamond lapped hole with full length drill bearing.

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Job micro-drilling of your parts.

Engineered MICRO-TOOLING, drills, jigs, collets, etc.

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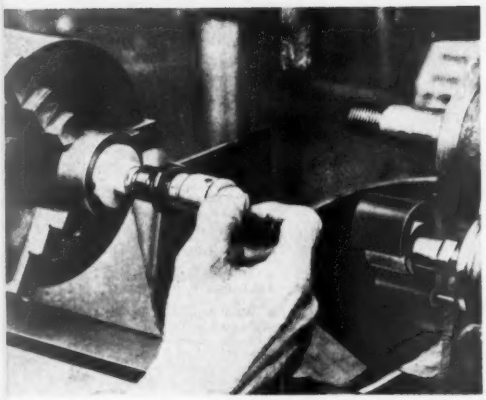
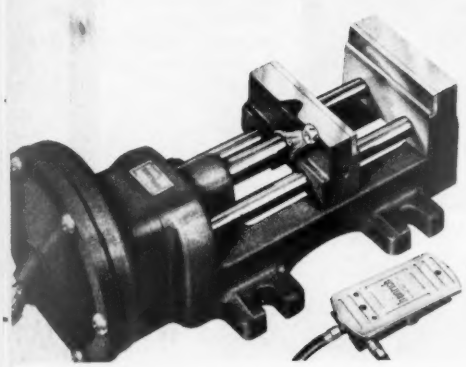


INTERNAL MIKE . . .

The "Matrix" Micro-Maag Internal Micrometer positively determines bore sizes ¼" to 8" dia to extremely fine limits. Graduations on the thimble read directly to 0.00005" on the small sets, and to 0.0001" or 0.0002" on the larger sets. Engis Equipment Co., 431 S. Dearborn St., Chicago 5, are exclusive U. S. distributors. To ask for literature—

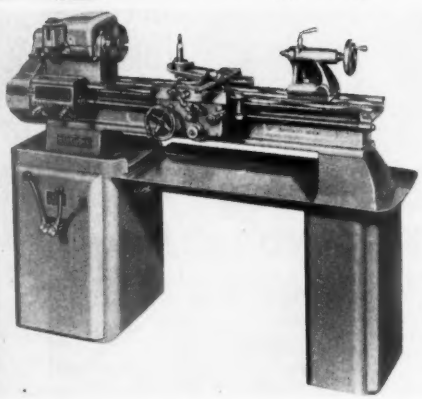
Inform-A-Gram No. A1.



AIR VISE . . .

Gripping with a force 15 times air line pressure, Model 44 Air Vise by Heinrich Tools, Inc., Racine, Wis., features positive, fast-acting foot control for greater accuracy and increased production in less time. The new larger 4" jaw width is adjustable to a 4½" maximum opening. The vise operates from air line or compressor at 150 psi maximum pressure.

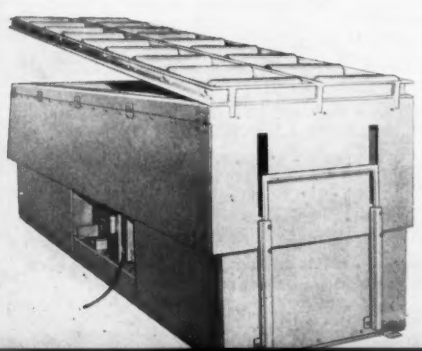
Inform-A-Gram No. A2.



LATHES . . .

The pedestal design of the new 10", 11", and 13" Sheldon lathes provides greater operator convenience and sturdier construction. Other features include double neoprene cog V-belts, new safety-type switch, "zero precision" tapered roller bearings, and quick-change gear box with 54 pitches. Sheldon Machine Co., Inc., 4258 N. Knox Ave., Chicago 41.

Inform-A-Gram No. A3.



ELEVATING TABLE . . .

This conveyorized elevating table handles long sheets of material being fed into blanking presses, etc. Roller conveyor type top is 40" by 144", and hinged for raising one end to 18". Union Tool Corp., Warsaw, Ind., or—

Inform-A-Gram No. A4.

CUTTER GRINDER . . .

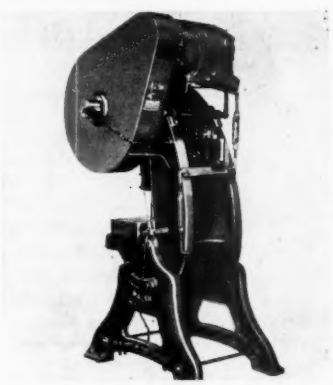
For precision sharpening of single-flute milling or engraving cutters, an especially compact and complete machine is announced by Johnson & Bassett,

Inc., Worcester, Mass. Model MT1100 Cutter Grinder has a built-in diamond wheel dresser mounted on the wheel guard, allowing the wheel to be dressed without disturbing the tool head. For more information —

Circle Inform-A-Gram No. A5.

"HI-FLEX" SYSTEM . . .

The Packaged "Hi-Flex" system for presses includes a variable speed drive, high speed mechanical on-off brake, and automatic lubrication system. It adds



production flexibility, speed, and safety to the Walsh line of open back, inclinable punch presses. Hi-Flex is available on all Walsh presses from 6 to 65 tons from Walsh Press & Die Co., 4709 W. Kinzie St., Chicago.

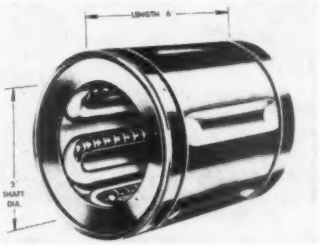
Cihcle Inform-A-Gram No. A6.

ON PARADE

Mail FREE Inform-A-Gram Card for MORE Details.

LINEAR BEARINGS . . .

New large size linear ball bearings for use on 3" dia shafts are available from Thomson Industries, Inc., Manhasset, N. Y. Smaller size "Ball Bushings"



have been used for some time. The new larger bearings are suitable for heavy load applications and where extreme rigidity is required in equipment where linear motion is found.

Circle Inform-A-Gram No. A7.

PRESSES . . .

Forty-three tons of pressure at the bottom of the stroke makes the new Model 44 open back inclinable punch press by Johnston Machine & Press Corp., Elkhart, Ind., adaptable to most intermediate press tasks. Standard stroke is 4". To get complete specifications —

Circle Inform-A-Gram No. A8.

FLOOR LATHES . . .

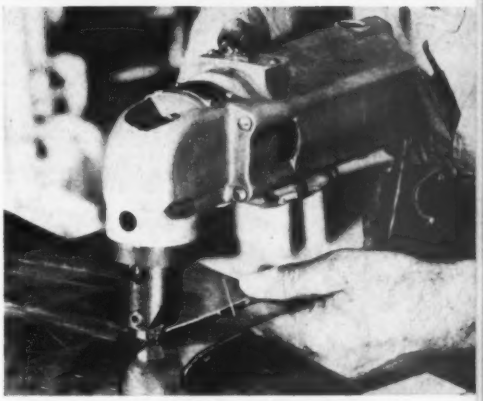
A new line of popular priced 9" and 10" swing self-contained floor lathes introduced by the South Bend Lathe Works, South

Bend, Ind., is designed to combine the advantages of floor mounting with the economy of bench lathe construction. Ask for Bulletin 5442. **Circle No. A9.**

"NIBBLER" CUTTER . . .

The new Fenway "Nibbler" will cut up to 18 gauge stainless steel and other sheet stock up to 16 gauge. It is handy for cutting irregular, rounded, or special shapes, and will cut contoured stock without damaging original contour. It cuts 43" per min. at any angle using a punch and die action. Fenway Machine Co., 263 N. 23 St., Philadelphia 3, Pa.

Inform-A-Gram No. A10.



BRUSHING LATHE . . .

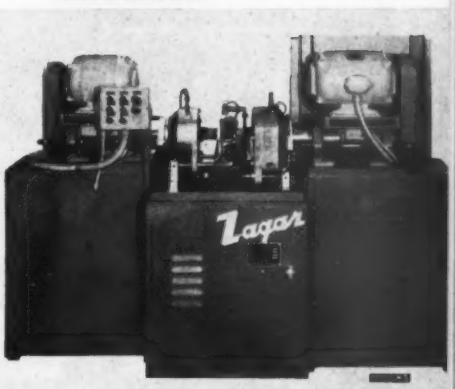
Designed primarily for deburring both face edges of gear or sprocket teeth simultaneously with the use of two 12" dia brushes spaced for contact with opposite radii of the gear, this automatic cycle high production Brushing Lathe is suitable for work 3" to 10" dia. Get more information from Standard Electrical Tool Co., Mt. Hope & Sixth, Cincinnati, or —

Inform-A-Gram No. A11.

PRODUCTION DRILL...

This Horizontal Drilling Machine produces steel inserts (sprags) 3/8" square for automatic transmission assemblies, but is adaptable for a wide variety of setups. It has two Zagar Gearless Drill Heads and a production potential of 3600 holes per min. Zagar Tool, Inc., 24000 Lakeland Blvd., Cleveland 23, designed and built the machine.

Inform-A-Gram No. A12.

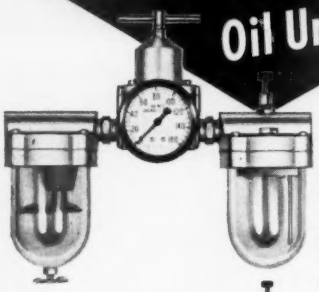


AUTOMATIC SAW . . .

DoAll's new Power Saw is especially built for the new "Demon" saw bands. It features hydraulically regulated feed pressure and band tensioning, and variable speed control. The DoAll Co., Des Plaines, Ill., or—

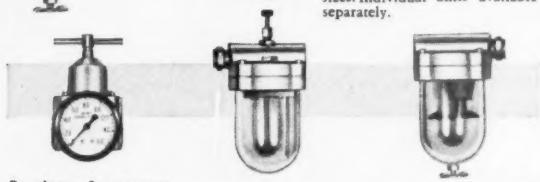
Inform-A-Gram No. A13.

AIR-MITE
FILTER—REGULATOR
Oil Unit



- Instantaneous response to demand
- Special Filter for cleaner air
- Accurate injection of pre-atomized oil

The new AIR-MITE unit is designed and built for maximum operating efficiency, easy maintenance and long life. Operates at pressures to 160 psi. Available in ¼", ⅜" and ½" T.P. sizes. Individual units available separately.



Regulator—Incorporates piston cup instead of diaphragm. Provides more accurate, stable regulation, lasts longer. Direct reading gauge for close regulation of outlet pressure.

Lubricator — Automatically pre-atomizes and feeds oil mist into air stream. Simple micro adjustment permits accurate balance of oil-to-air supply.

Filter — Porous sintered bronze element filters better . . . won't collapse . . . is easy to clean. Built in air baffle. Brass drain cock.

Write for catalog sheets and prices.

AIR-MITE Devices, Inc.

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and be precision sure!

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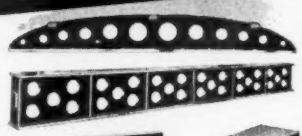
Special Analysis Semi-Steel Fine grain. Precision ground or hand scraped.



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V-BLOCKS V accuracy of .0005-inch.

ANGLE PLATES In 22 sizes for clamping & holding work.

BOX PARALLELS In every size for every use.

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ALL WELDED CONSTRUCTION Outlasts stamped type clamps 5-1.

EXTRA LARGE PIVOT PINS 300% more bearing surface than other clamps.

HEAVIER FRAME Cannot spring or bend under maximum load.

HEAVIER LINKS AND HANDLE Pipe extension handle cannot damage clamp.

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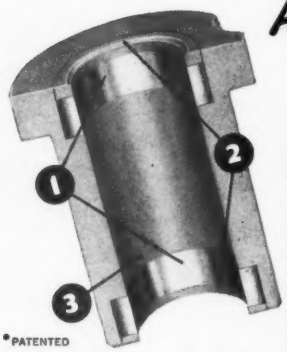

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1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

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Carbide Inserted Bushings Are Doing It Daily!

HOW? Like this: (1) Last longer . . . with a life—in most cases—as long as solid carbide bushings at prices that come close to the prices of ordinary steel bushings; (2) Increased life for your drill jigs and fixtures; (3) Increased life for your drills and reamers; (4) Accuracy maintained for a LONG PERIOD of time; (5) Less non-productive machine time, less lost man-hours, because bushings need not be changed as often; (6) Inspection time saved, because of greater accuracy for a longer time; and (7) Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!

W. F. MEYERS CO., INC., BEDFORD, INDIANA

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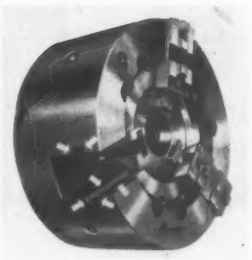
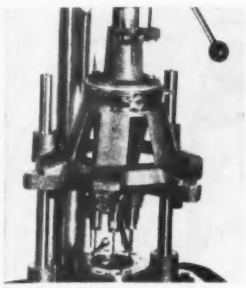
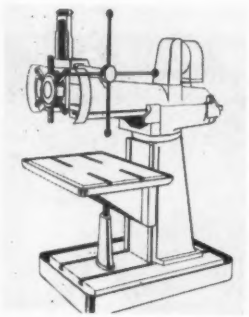


Air Chucks with keyways and important bearing surfaces hardened to increase chuck life, as a standard feature (as indicated by arrows in the illustration), are now available from the Buck Tool Co., Kalamazoo, Mich. These chucks are now available in 10" and 12" dia sizes with 2 or 3 jaws. **No. A14.**



This Flexible Shaft Driven adjustable spindle multiple head will tap and drill up to six holes on any machine. It can be set in a wide range of hole patterns and can be used horizontally or vertically. Model 600 Ettco-Emrick, Ettco Tool Co., Inc., 594 Johnson Ave., Brooklyn 37, N. Y.
Inform-A-Gram No. A15.

A Newly Designed Pneumatic Die Cushion by Dayton Rogers Mfg. Co., Minneapolis 7, Minn., is for double crank power presses. Wall thickness is 1⅛" with an overlap of about 36". On a 100 lb. air-line the extra heavy all steel cushion develops a 38-ton ring holding pressure. The 10" drawing stroke capacity will compensate for a minimum amount of off-center loading. **Circle No. A16.**



New 2BR "Burgmaster" six spindle turret type radial drill will greatly increase production on bulky pieces as all tools are mounted on the machine and are quickly indexed into position. Features include preselective spindle speeds (225-3000 rpm) and depth control; power index; ¾" drill capacity in steel; radius of 17" to 41". Burg Tool Mfg. Co., Box 48, Gardena, Calif.
Inform-A-Gram No. A17.

Improvements on the Hydraulic Feed Surface Grinders by Covel are closed hydraulic circuit with pump and motor mounted on top of removable tank, vertical slide ways 4" wider, and saddle and base column way 6" wider. Model No. 20 has a 10" dia wheel; Model 35, a 12" dia. Three speed interchangeable, ball bearing, quill type spindles are standard equipment. Covel Mfg. Co., Dept. 117, Benton Harbor, Mich.
Inform-A-Gram No. A18.

Powered by the press ram... independent of the die

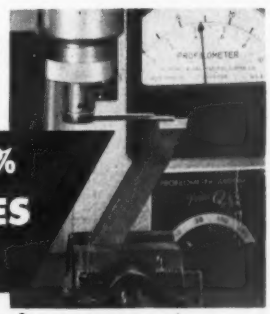
1. **CHOPS** *steel* up to 3" wide, ⅛" thick.
2. **FITS** any punch press . . . easy to install.
3. **CUTS DOWNTIME** . . . *high speed steel* blades installed in a moment.
4. **SAVES HANDLING SCRAP** . . . scrap falls into collection barrel.
5. **SAVES MONEY** . . . low purchase price, no operating cost.

Write today for full details

JACO DEVICES, INC.
96 HIGH STREET • HINGHAM, MASS.

CIRCLE INFORM-A-GRAM KEY NO. 1491

The PROFILOMETER® can help you get



90% to 800% MORE PIECES PER GRIND

from cutting tools of every type!

WELL-KNOWN COMPANIES are getting *90% to 800% more pieces per grind*—with important savings in production time, tool-sharpening time, and tool replacement cost. Here's how they do it:

In sharpening, they grind or lap the tool faces to a finish of 1 to 5 microinches. A difference of a few microinches can vitally affect performance; so they *specify* the microinch finish and *measure* it with the PROFILOMETER to make SURE. The savings obtained far outweigh the little time required to make such measurements.

FREE BULLETIN L22 gives details — includes *case histories* of savings obtained. Write for it!

Profilometer is a registered trade mark.

MICROMETRICAL MANUFACTURING COMPANY
339 S. MAIN ST. ANN ARBOR, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1492

2 Economy LIFTERS

EVERY TOOL AND DIE ROOM SHOULD HAVE FOR FAST, SAFE, HANDLING OF DIES

SHOPLIFTER

Use the SHOPLIFTER to avoid risk of painful accidents and to protect costly dies. Transport dies from storage area to press. To move dies in and out of press. Use it as an adjustable height bench for working on dies.

Platform lift 4'6", high enough for all press beds, yet overall height will clear any standard doorway.

Width 24". Moves easily between machines —in confined areas.

Spur gear hoist unit — most efficient hoist mechanism — lifts capacity load with only 20# crank pressure.

Friction disc clutch holds load securely — automatically.

Big safety factor for occasional overloading when necessary.

Three capacities to choose from

Type D (illustrated) 500 lbs. capacity	$183.60
Type DX—1000 lbs. capacity	350.00
Type DX—2000 lbs. capacity	420.00

ELEVATING TABLE

A husky Elevating Die Table, with big overload safety factor. Use as work bench at each machine.

Dimension 24"x36". Use it for small, medium and large dies. Capacity 2,000 lbs.

Write for New Economy Catalog 55 describing all Economy standard products, special engineered overhead service lifters, and material handling machines.

GREATER LIFTING RANGE

24" minimum to 42" maximum height. Wheels under base-frame—you can get up tight against press or rack.

Four crank studs—two at each end of table for high and low speed adjustment.

Roller bearings in wheels and casters for easy moving.

Floor lock holds table securely when moving DIES on and off.

Price $215.00 F.O.B. Chicago.

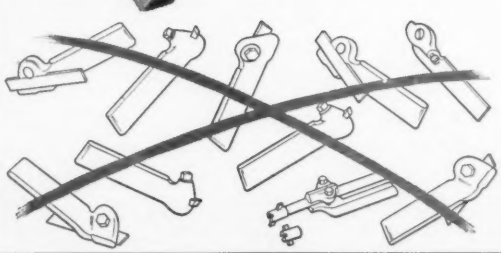
Available from your local supplier

ECONOMY ENGINEERING CO., 4509 W. Lake St., Chicago 24, Illinois

Eastern sales office, 342 Madison Ave., New York 17, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1501

ONE ALL-PURPOSE TOOL HOLDER INSTEAD OF TEN



ONE tool holder for all positions . . . No tool chatter . . . can do internal boring or internal threading . . . Ideal for carbide tools . . . Bit sizes: ¼", 5/16", ⅜", 7/16", ½", ⅝".

Furnished with Cobalt Bits

ELK TOOLS, Inc.

73 WEST BROADWAY

NEW YORK 7, N. Y.

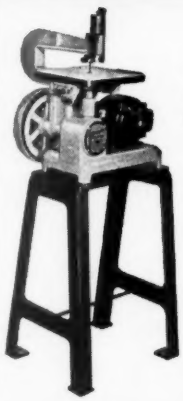
CIRCLE INFORM-A-GRAM KEY NO. 1503

CUT TOOL AND DIE-MAKING COSTS WITH . . .

Milwaukee

DIE FILERS

PROFILE GRINDERS



DIE FILERS

. . . for straight-line sharp corner filing, sawing and lapping

This low cost precision-built unit performs all die making operations at savings up to 40%. Furnished complete with motor and two overarms. No extras to buy.

Write for illustrated Bulletins and Prices

PROFILE GRINDERS

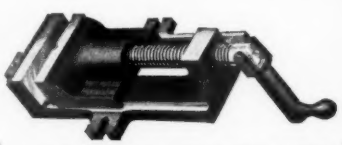
. . . for high speed Precision Grinding of curved and Irregular Contours

Standard features include 20,000 or 30,000 R.P.M., or a combination of these spindle speeds, ½ H.P. motor, Collet Chuck, Compound tilting table, built-in wheel dresser.

RICE PUMP & MACHINE COMPANY

228 PARK AVENUE BELGIUM, WISCONSIN

CIRCLE INFORM-A-GRAM KEY NO. 1502



YOST DRILL PRESS VISE

• This new Yost vise has been designed expressly for use on drill press operations. Does away with special and costly jig fixtures.

OFFERED IN TWO SIZES

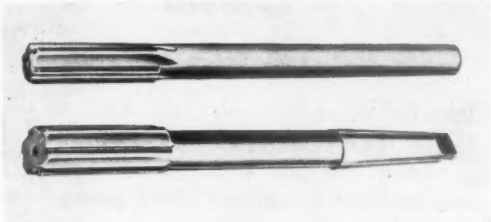
Vise No.	Width of Jaw, Inches	Opens Inches	Weight Pounds
1D	3½	4	12½
2D	5	5½	23

Do you need a vise of ANY type?
Write today for bulletin on the extensive Yost line

YOST MFG. COMPANY
1000 MAIN STREET
Meadville • Pennsylvania

CIRCLE INFORM-A-GRAM KEY NO. 1504

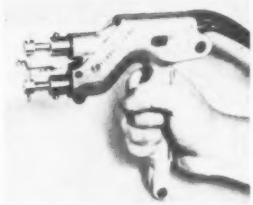
Semi-Finished Carbide Reamers are now available from Super Tool Co., 21650 Hoover Rd., Detroit 13, Mich. The reamers are furnished in regular and flute-long

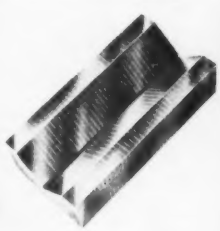


types with straight or tapered shanks and with 0.020" grinding stock, enabling tool rooms to turn out any size within each range. **Circle Inform-A-Gram No. A19.**

This Toggle-Action Table Clamp has an adjustable "Bolt Retainer" and solid steel "L" shaped base for clamp installation on flat surfaces or slotted tables. The Bolt Retainer permits angular adjustment of the pressure foot assembly for clamping on flat or inclined work. Model No. 801, Robert T. Kelly Mfg. Co., Box 4938 Redford Sta., Detroit 19, or— **Inform-A-Gram No. A20.**

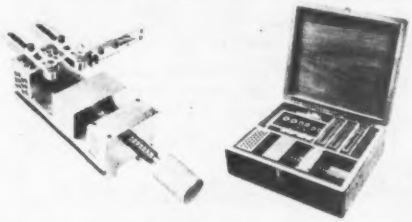
The "Tweezer-Weld" Gun will weld materials from 0.003" to the combined thickness of 0.074". It will develop electrode pressures from one to 50 lbs. with a light hand squeeze pressure. Applications are unlimited. Federal Tool Engineering Co., 1388 Pompton Ave., Cedar Grove, N. J. **Inform-A-Gram No. A21.**





These Magnetic Parallels and V-blocks are all-steel welded construction with alternate laminations of 1/32" non-magnetic steel and ⅛" low carbon steel. With standard size "Magna-Lock" parallels toolrooms can make their own grinding fixtures. Hanchett Magna-Lock Corp., Dep't P1650, Big Rapids, Mich. **No. A22.**

A Universal Drill Jig for accurately locating holes in small lot manufacture is being marketed by Rynd Tool Co., Inc., Meadville, Pa. Consisting of a hardened and ground vise equipped with bushing arms and stops and

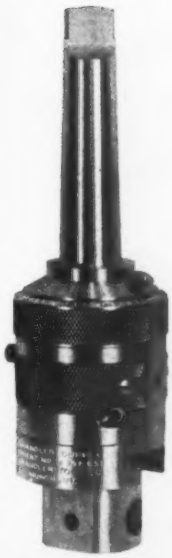


packed in a sturdy wood case, set-ups are quickly made by the use of standard gage blocks to establish the locations of the drill bushings to an accuracy of less than 0.001". **Circle Inform-A-Gram No. A23.**

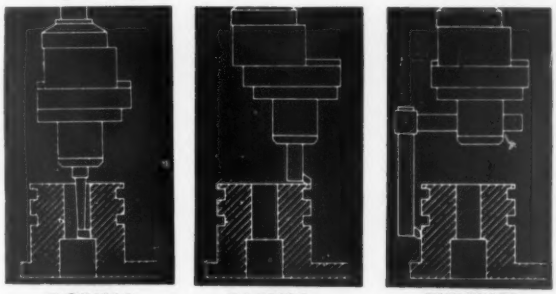
A Boring Head That Won't Face is NOT Complete

CHANDLER-DUPLEX Does ALL IN SET-UP

BORING
FACING
TURNING
GROOVING
UNDER-CUTTING



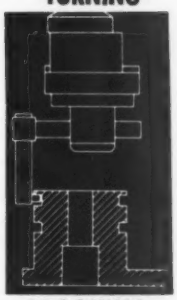
The **CHANDLER-DUPLEX** Combined Boring and Facing Toolhead has many features not found in ordinary makes . . . such as power feed for facing, longer slide travel, extremely fine adjustment, tee slot positioning of cutting bar, universal range and adaptability.



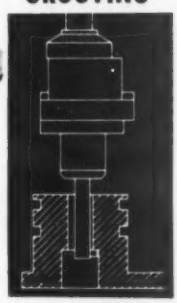
BORING FACING TURNING

CHANDLER-DUPLEX *combines* boring and facing — permits all these operations in one set-up. Built for efficiency, accuracy and stamina.

A Model for Any Size Machine



GROOVING



UNDERCUTTING

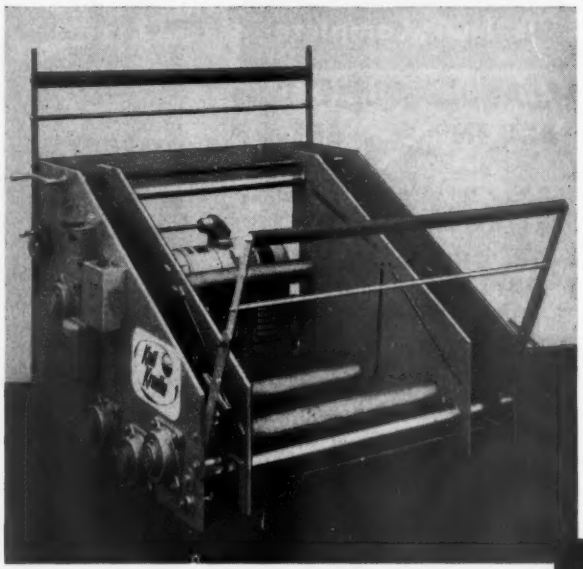
Write today for full details and Catalog on this combined Boring and Facing Toolhead

CHANDLER TOOL CO.
Muncie, Indiana

COMBINED BORING & FACING TOOL HEADS
Chandler-Duplex

CIRCLE INFORM-A-GRAM KEY NO. 1511

NEW 7000 lb. Koil-Kradle



feeds 40" stock from 42" rolls

benchmaster
now supplies all KOIL-KRADLE requirements, standard or special, from ½ ton to 8 tons capacity.

OPERATES INTERMITTENTLY using Vari-loop Control to sustain a slack loop from which any machine can draw.

OPERATES CONTINUOUSLY at any constant speed within range of variable-speed driving unit.

DUAL GUIDE PLATES quickly adjust for any stock width up to 40".

ALL ROLLS HARDENED. Power driven rolls mounted in self-aligning bearings.

There's only one KOIL KRADLE! Write for quotations on your coil-feeding requirements.

1835 West Rosecrans Avenue, Gardena, California

benchmaster

World's largest manufacturer of small punch presses and mills.

CIRCLE INFORM-A-GRAM KEY NO. 1521

USE LIGHTWEIGHT ANCHOR BUSHING DRILL TEMPLATES

STANDARD REGULAR

NUT PLATE

Anchor Bushings for sheet metal drill templates.

CIRCLE

KNURLED

DIAMOND

Anchor Bushings for laminated plastic drill templates.

Lightweight sheet metal or plastic Anchor Bushing drill templates are easy to handle. You reduce worker fatigue and are able to use "off-the-floor" storage facilities.

Sheet metal Anchor Bushing drill templates weigh about one third the weight of conventional drill tooling. Depending on lamination thickness, plastic Anchor Bushing drill templates are similar in weight to sheet metal templates.

When compared to drill jigs or fixtures, additional Anchor Bushing benefits are realized in lower cost for materials and bushings and in less skilled help required to produce accurate drill tooling.

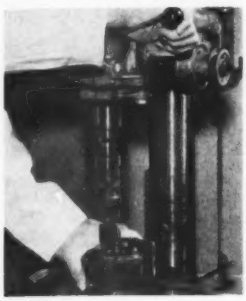
Easy-to-make drill tooling is described in the Anchor Bushing Catalog — write for it.

Used in tight quarters, a sheet metal Anchor Bushing Drill template at Ryan Aeronautical Company, San Diego, California

hi-shear **RIVET TOOL COMPANY**
8924 BELLANCA AVE., LOS ANGELES 45, CALIFORNIA

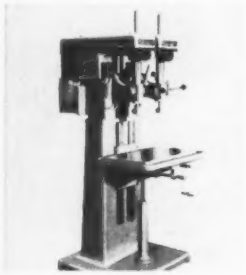
CIRCLE INFORM-A-GRAM KEY NO. 1522

An Ultra-Fine Plain Plu Gage tolerance of 0.00001" (designated Class XXX, one-half of Class XX) announced by The Van Keuren Co., 176 Waltham St., Watertown, Mass., answers demands for gages which will suit part limits finer than 0.0002". Class XXX gages are offered only in carbide or chromium plated stock, wire and taper lock types, in various sizes. **Inform-A-Gram No. A24.**



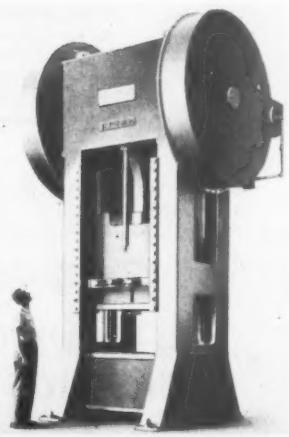
"Pow-OR-Tork" Wrench operates first as a nut runner, then as a true torque wrench until the fastener reaches the pre-determined torque, and then it automatically releases. Available in all sizes and with various types of drive, the unit is manufactured by Ohlsson & Rice, Inc., 3340 Emery St., Los Angeles 23, Calif. **Inform-A-Gram No. A25.**

This Self-Feeding Rotary Straightener is only 16" long, and is especially suited for small shop fine wire straightening requirements. The straightener and a choice of arbors mounted in ball bearings, each with five straightening dies, is available from Mettler Machine Tool, Inc., New Haven, Conn. **Circle No. A26.**



New IF Sensitive Drilling Machine with infinitely variable speeds from 1250 to 10,000 rpm has these features: "Vari-Speed" drive, micrometer graduated depth control, and sensitive spindle tension control. Pedestal and bench models are available in one to six spindle units. Edlund Machinery Co., Cortland 38, N. Y. **Circle No. A27.**

Twin-Geared "Steelweld" single-point presses of the straight-side tie-rod type are the latest addition to the press line of The Cleveland Crane & En'g Co., Wickliffe, Ohio. Sizes range from 150 to 500 tons and have bolster areas of 30" by 36" to 42" by 48"; operating speeds are from 10 to 20 strokes per min. The air cushions are designed to prevent foreign materials from working in. **No. A28.**

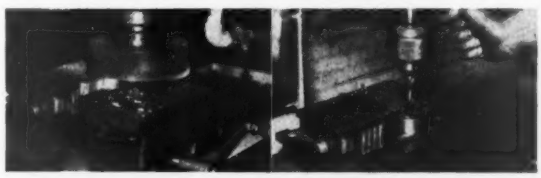


THE VISE WITH A
THOUSAND GRIPS

'FLEXIBLE JAWS' GRIP ANY SHAPE!

Positive grip vise. Grips any irregular shape. Grips secure and positive for the most precise milling, drilling or cutting operation. Eliminate the time and expense of blocking and shimming irregular pieces for toolroom machining. Try it in your shop. Save time and dollars on small production runs. Write for complete information now.

Applicable on any machine tool.



Western Industrial Exposition and Convention
March 14-18 Garrett Supply Company Booth

AMPOGRIP CONTOUR GRIPPING UNIVERSAL FIXTURES
AMERICAN POSITIVE GRIP VISE CORP.
1-H Olivine Street • Willimansett, Mass.

CIRCLE INFORM-A-GRAM KEY NO. 1531

CYCLONE SEPARATION

FOR MORE EFFICIENT DUST COLLECTION —FILTERS LAST LONGER

Almost all industrial dusts can be collected more efficiently by Dustkop. Thirty-seven standard models *ready to use!* Reduce installation costs — save space. Write for descriptive literature.

DUSTKOP STOPS DUST

ALSO A COMPLETE LINE OF MIST COLLECTORS

AGET MANUFACTURING COMPANY
1394 EAST CHURCH ST., ADRIAN, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 1532

2 all new tools

HIGH SPEED TURBINE AIR GRINDER for grinding and milling. 90,000, 70,000 and 55,000 rpm models. Powerful, economical, light, portable. Full range speed adjustment. Low air consumption.

ELECTRIC VIBRATING PEN Engraves any metal. Use like fountain pen. Adjustable engraving depth. Fast. Permanent. Shockproof. Small, compact transformer. AC 115, 220, 250 V.

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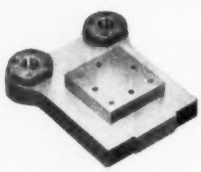
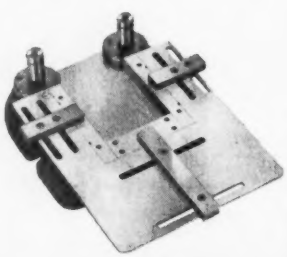
CIRCLE INFORM-A-GRAM KEY NO. 1541

Punches and Dies

Notching Die with Gauge Table





Standard stock sizes 4", 5" and 6". Lick those Notching Problems QUICKLY. Gauge table and gauging bars provide accuracy and speed with easy adjustment.

This is another of the many different kinds of punches and dies in stock or made to order for foot, hand or power operation. Precision made from high grade tool steel. Also adaptors and die shoes to convert your press.

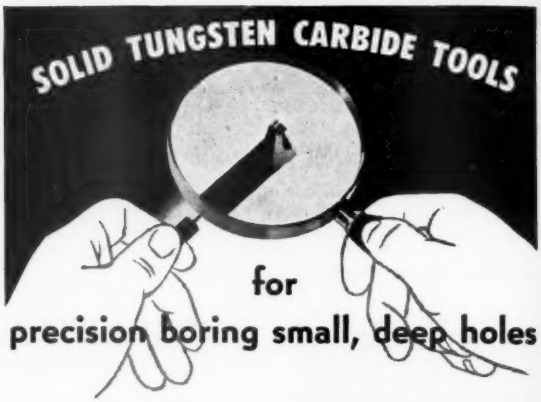
Immediate Delivery

What are your punch and die needs? Consult us about your problems. Prompt service on "Specials" made to your order.

Send for free illustrated catalog No. 154 AB. Net prices shown.

WARD Machinery Co. 564 West Washington Chicago 6

CIRCLE INFORM-A-GRAM KEY NO. 1543



It you have the problem of precision boring *deep, small holes* you'll get maximum results if you come to Bokum. You'll save because you'll be able to hold to exceptionally close tolerances—complete the boring operation often in one pass rather than several.

And you'll save with extra-long tool life, too. Shanks are made of a tough grade carbide for maximum strength and rigidity. Clearance is retained throughout the life of the tool, the shape of the cross section remains constant, and resharpening is required on the top face only. Tools are furnished in two of the highest grade materials recognized for wear resistance. TC-4 for boring cast iron and non-ferrous materials and TC-8 for finish boring of steel.

Write today for catalog 948. It's packed with information you can use.

Dept. F

4237 TRADE MARK REG. U. S. PAT. OFF.

BOKUM TOOL CO. 14775 Wildemere Ave., Detroit 38, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 1542

Cut costs on hole cutting with . . .

BOREMASTER

Finished holes 1½" to 11¾" diameter to a depth of 8" on your present equipment with THE BOREMASTER

Not just another Trepanning Cutter but a real heavy duty tool. Stock removed in one piece eliminating waste.

TIME SAVINGS + MATERIAL SAVINGS = COST SAVINGS

For full details write

KARL A. NEISE 404 Fourth Ave., Dept. TP, New York 16, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1544

PRESSURELOK-224

the best diamond wheel ever developed for carbide tool grinding. Guaranteed ultimate cutting life from each diamond particle in every wheel.

UNITED STATES DIAMOND WHEEL CO. 1833 ILLINOIS AVE. AURORA, ILL. US

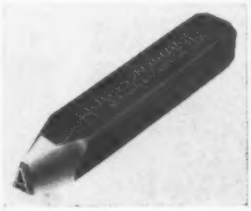
IMMEDIATE DELIVERY on all wheel sizes. STRAIGHT, DISH, CUP, FLARE and MOUNTED WHEELS; HONES.

CIRCLE INFORM-A-GRAM KEY NO. 1545

For Your Future

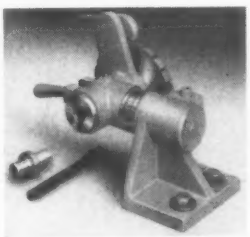
BUY U. S. SAVINGS BONDS

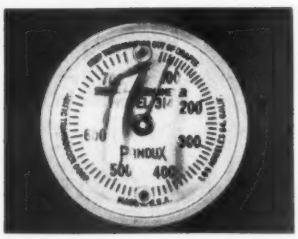
Permanent Identification of the light metals may now be safely stamped with a line of rounded face Low Stress Hand Stamps designed and produced by Hoggson & Pettis Mfg. Co., 141 Brewery St., New Haven, Conn., to indent, but not cut or crack the metal under normal use. Low Stress Hand Stamps are available in five stock character sizes from 1/16" to ¼". **Inform-A-Gram No. A29.**



High Capacity Wales Hydra Springs provide more force in much smaller space than mechanical springs as a result of utilizing the compressibility of special fluids called "Wales Comproils." Force and stroke of the semi-standard springs is adjusted by changing preloads, volumes, or types of Comproils. Wales-Strippit Corp., 345 Payne Ave., N. Tonawanda, N. Y. **No. A30.**

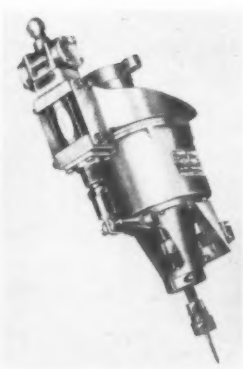
This Indexing Work Holder for use on milling machines and pantographs is small and light-weight and holds work up to 6" dia, of any face width. The spindle may be locked in any position and the graduated swivel joint allows work to be pivoted and clamped in any position. Model MT 1300 is shown. Johnson & Bassett, Inc., Production Tool Div'n, Worcester, Mass.
Inform-A-Gram No. A31.





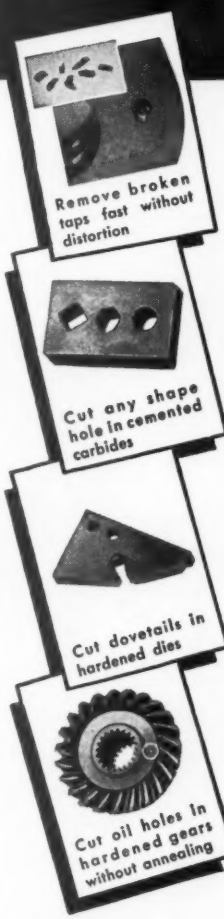
A New Surface Temperature Thermometer designed for fast and accurate checking of hot plates, platens, die casting dies, plastic molds, etc., where temperatures range from 50° to 750°F., is available from Pacific Transducer Corp., 11836 W. Pico Blvd., Los Angeles 64, Calif.
Circle No. A32.

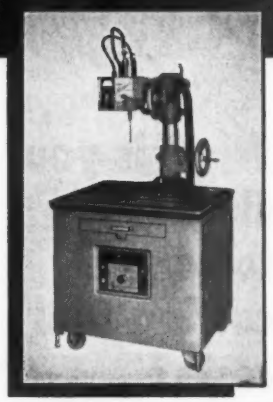
Fully or Semi-Automatic Lead Screw tapping is possible on any drill press with the newest "Auto-Tap" heads. Tap breakage and work spoilage are reduced because the lead screw takes all end thrust and guides the tap in all directions. A positive mechanical depth control permits blind holes to be tapped safely and accurately. Auto-Tap heads attach readily to the quill of most standard drill presses. Automatic Methods, Inc., 965 W. Grand St., Div'n 205A, Elizabeth, N. J. **No. A33.**



METAL DISINTEGRATION

and what it can do for you


Remove broken taps fast without distortion
Cut any shape hole in cemented carbides
Cut dovetails in hardened dies
Cut oil holes in hardened gears without annealing



Literally hundreds of thousands of dollars are saved annually by corporations that are using Metalmasters in just tool and die repair alone.

There's a technical engineer in your area to give you an on-the-spot demonstration in your own plant at your convenience. (NOTE: It is not uncommon to pay for a Metalmaster with just one short demonstration through savings on workpieces.

There's a Metalmaster designed for your operation and priced to fit your needs. For information as to the many uses and benefits Metalmaster can offer you, write today on your company letterhead to:

Metalmaster
DIVISION OF CLINTON MACHINE COMPANY
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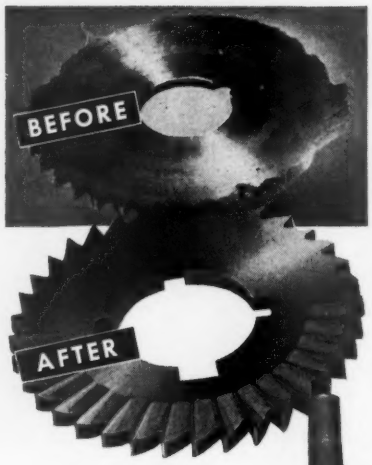
CIRCLE INFORM-A-GRAM KEY NO. 1551



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For over 40 years we have served countless industries, restoring their damaged tools and re-cutting their worn tools for other operations.

Are you sure your shop is not scrapping tools that can be reclaimed or converted at a fraction the cost of new tools. We work with both H.S.S. and carbide.

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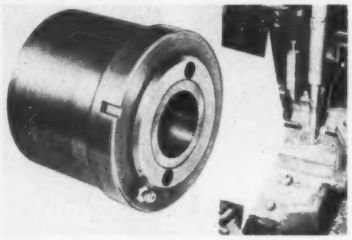
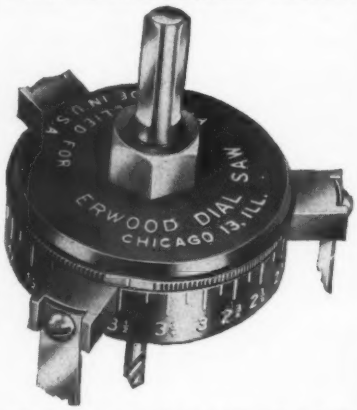
CIRCLE INFORM-A-GRAM KEY NO. 1561

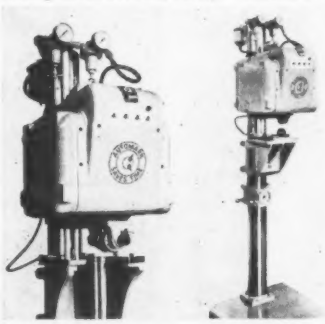
Jergens Live Bushings hold tolerance, reduce tool breakage, bar wear and scoring, chatter and spindle bearing wear. They increase the speed of production on older equipment especially, in permitting the use of carbide tools to full capacity. Shown is an application of a Live Bushing on a radial drill press. Jergens, Div'n of Donley Products, Inc., 11106 Avon Ave., Cleveland, Ohio.
Circle Inform-A-Gram No. A34.



The New Dial Saw by Erwood cuts holes from 1⅛" to 3½" dia, in steel, copper, brass, aluminum, plastics, wood, and other materials. Each No. 400 saw is complete with pilot drill and three sets of cutting blades. Erwood, Inc., 1770 Berteau Ave., Chicago 13, Ill.
Circle Inform-A-Gram No. A35.



An Automatic Roll Marking Machine which indents numbers, letters, or designs on all types of surfaces is being manufactured by Defiance Machine & Tool Co., 1920 S. Vandeventer Ave., St. Louis 10. The "Automark," Model RMA-1, is air powered and can accommodate unusually large parts. **Inform-A-Gram No. A36.**



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NO OTHER GAUGE COMPARES FOR FAST, ACCURATE LAYOUT AND MEASURING

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Capacities to 6" when used with this Fairfield Gauge 3" Riser

The Micro-Height Gauge is a precision instrument, finished in satin chrome, which reads like a micrometer and measures from zero at base to 3" in thousandths.

Use as a scriber for fast layout, or insert dial indicator for quick, accurate inspection.

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LINDERME 2-SPINDLE ADJUSTABLE DRILLING HEAD

Drills, taps metal, wood, plastics. 2-minute setup on most drill presses; quick, accurate adjustment. Variety of models, ½" to 12⅝" centers.

The drill spindles are held rigidly in position when two nuts are tightened. Sturdily constructed. Suitable for adaptation to large or small drill presses. Models A and B made with sleeve. Models C and D with overarm adaptation, equipped with guide pins, springs and brackets, mounted to a cast-iron base with surfaces ground for use of drill fixtures. All models can be used for drilling or tapping on tapping machine or drill press with reversible spindle. Also used with standard tapping heads.

Multiple heads with fixed center distances are designed and built to meet your requirements. Available with GM Sleeves, Morse taper or drill chucks.

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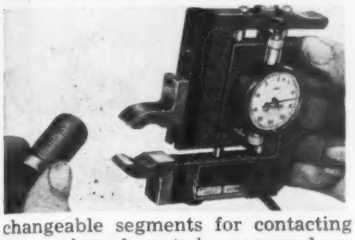
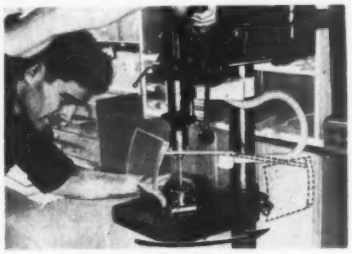
"Versa-Dial" is useful for checking internal or external threads, grooves, shallow counterbores, narrow shoulders, etc. A wide variety of inter-



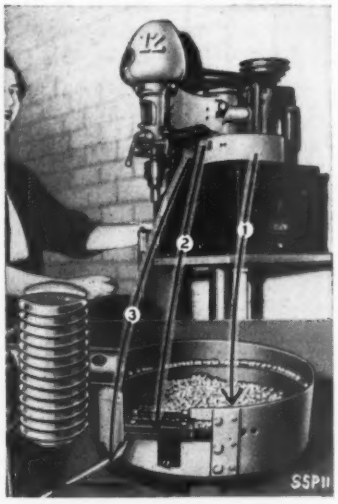
changeable segments for contacting the work surfaces to be measured are secured in "T" slots at desired spacing. Standard Gage Co., Inc., Poughkeepsie, N. Y. **Circle No. A37.**

A Machining Shield designed to protect the eyes and neck of the operator from flying chips automatically moves into position every time the operator pulls the spindle down



on a drill press, for instance, and retracts when the spindle is returned to start. "Chips Stopped" is a product of Alfred B. Hard Co., Ann Arbor, Mich. **Inform-A-Gram No. A38.**

A Hopper-Fed Headless Set Screw is the latest development of Set Screw & Mfg. Co., 158 Main St., Bartlett, Ill. Advantages of the new screw include faster application, diameter-inspection and rejection of



misfits, and equal success working with metals and plastics. The screws are mechanically fed from vibrating hopper and automatically positioned for driving, both exclusive "Setko" features. **Inform-A-Gram No. A39.**

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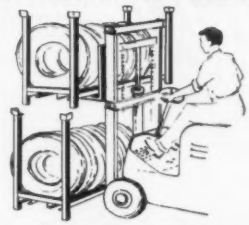

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Heat treat high speed steels
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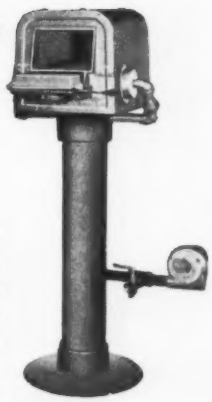

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Heat treat tools, dies and small metal parts in your own plant. Quick Acting JOHNSON No. 120 Hi-speed delivers 1500° F. in 5 minutes, reaches 2300° F. in 30 minutes. Gets the job done fast to save time and gas. Temperatures easily regulated with accuracy. Firebox 5 x 7¾ x 13½. Complete with Carbofrax Hearth, G. E. Motor and Johnson Blower.

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12-SPEED LATHE

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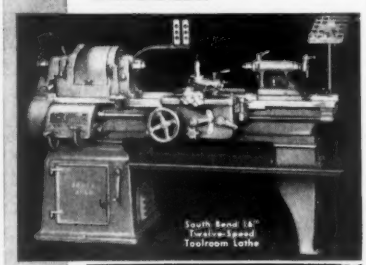
CL-8155C—as illustrated below, less motor and controls. Time payment terms available.



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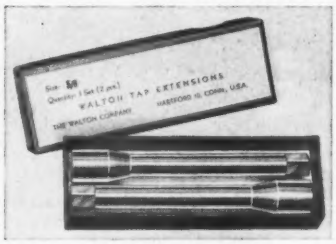
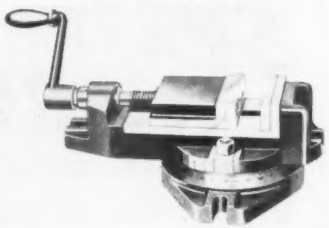
A Valuable Tool for Tapping in places where it is difficult or impossible to turn a tap wrench without lengthening the tap is now offered by The Walton Tool Co., Hartford 10, Conn. Walton Tap Extensions, formerly manufactured by Allen Mfg. Co., are made of special alloy steel and packaged as a set of two 5" extensions which can be used singly or in combination. Sizes fit all standard taps from No. 10-3/16" to 1". **Circle Inform-A-Gram No. A40.**

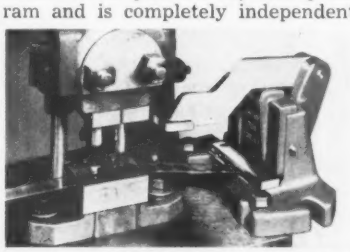


"The Stampmaster" is an improved numbering device that will find wide use in industry for random or selective numbering on all types of products where a permanent legible impression is to be applied by hand. Characters 3/32" and ⅛" are now available. The Noble & Westbrook Mfg. Co., East Hartford, Conn. Circle Inform-A-Gram No. A41.

An Advanced Screw Swivel Vise for milling machines, shapers, and drill presses is introduced by the Modern Tools Div'n of the Nelco Tool Co., Berlin, Conn. It features patented covers that prevent chips from falling into swivel sides; hardened and ground removable jaws; and semi-steel castings throughout. **Circle Inform-A-Gram No. A42.**



This Compact Scrap Chopper can be installed easily in any position close to the die by means of two bolts. It is powered by the press ram and is completely independent of the die or tool. Scrap cuttings fall into a container, eliminating extra handling. Durant Tool Supply Co., Providence 3, R. I., will supply catalogs. **Circle Inform-A-Gram No. A43.**



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Totally new—maximum rigidity, no chatter! Roughs or finishes holes to exact size in FORGINGS, CASTINGS, BOILER PLATE, THIN STOCK, TUBING; CROWNED, CYLINDRICAL AND FLAT SURFACES. One of 3 blades is *always* in the cut on odd work shapes—*smooth action even on intermittent cuts!* Use new HOLE-MAKERS in radial drills, drill presses, turret lathes, portable electric or pneumatic drills, etc. Excellent for trepanning and rough boring I.D.'s in Tubing, Castings, etc...a real production tool!

Holes can't drift, spindle can't deflect—it's piloted 2 ways!

Cuts steels, plastics, transite, non ferrous metals, stainless steel, etc!

5 ADJUSTABLE SIZES: Specify Straight Shank or M.T. 2. 3. 4. Other tapers on order.

Models:	102	203	304	405	506
Capacity:	1" to 2"	2" to 3"	3" to 4"	4" to 5"	5" to 6"

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Here's a truly "one man" press. It operates with one hand. Handy for tool and press rooms, it permits the diemaker to complete a die-set at his bench . . . saves toolroom and handling costs. Ask today for full details.

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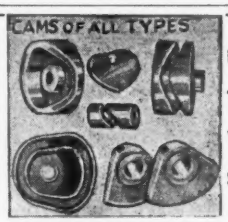
CAMS CAMS OF ALL TYPES  MADE TO YOUR SPECS.

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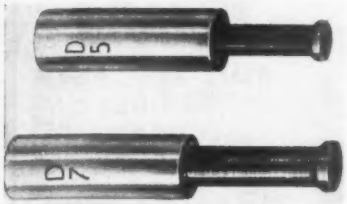
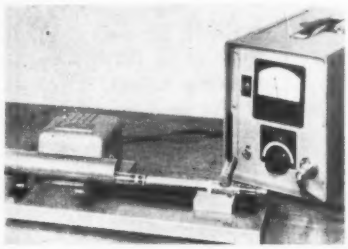
These Recessing Tools are important in a wide variety of screw machine applications. They are commonly used to groove the I.D. and to



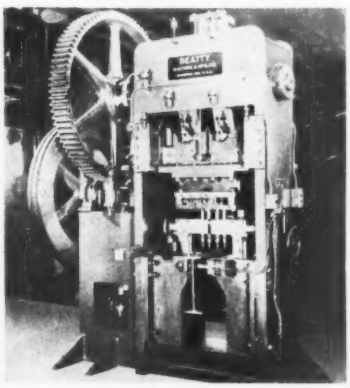
recess the end of a part before it is cut off to save a separate burring operation. Sizes fit holders with ¼" to ½" tool bit hole. Boyar-Schultz Corp., 2000 S. 25 St., Broadview, Ill.
Circle Inform-A-Gram No. A44.

Profilometer Roughness Measurements around the circumference of tubing, round bar stock, and other cylindrical pieces are taken with the



Type RF Cylinder Pilotor from Micrometrical Mfg. Co., 345 S. Main St., Ann Arbor, Mich. Bulletin LT117 describes it fully.
Circle Inform-A-Gram No. A45.

Guillotine Beam Flange Punch. A turn of a handwheel provides quick change of punching centers, at the same time synchronizing punch with die, on the new 200-tons capacity Beatty flange punch. The adjustable flange punch tools consist of



two frames which open and close about the center line of the beam. The machine is particularly useful to the steel fabricator whose type of work requires making frequent changes of punching centers. Write to Beatty Machine & Mfg. Co., Hammond, Ind., for details.
Circle Inform-A-Gram No. A46.

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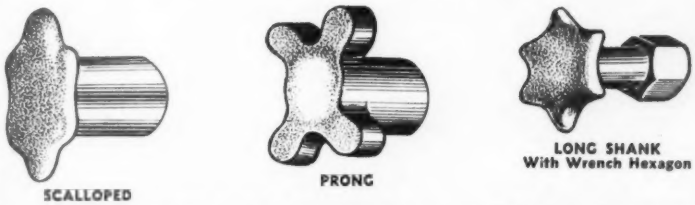

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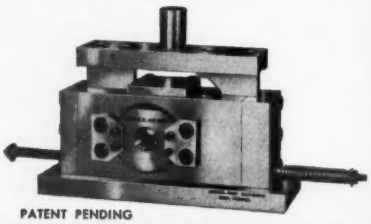

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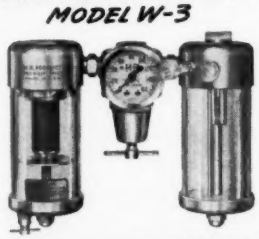
CIRCLE INFORM-A-GRAM KEY NO. 1603

3 in 1 GUARD of the AIR LINE

M-B WHIRL-A-WAY FILTER-REGULATOR and LUBRICATOR ASSEMBLY MODEL W-3

the BEST PROTECTION TO YOUR AIR-VALVES, CYLINDERS, PNEUMATIC TOOLS, ETC.



The FILTER removes solids .00039 and larger. TRANSPARENT BOWL provides visibility. REGULATOR capable of passing large volume with unrestricted flow and minimum pressure drop. LUBRICATOR delivers desired volume of oil. Bowl can be refilled without shutting off air supply.

ANY OF THESE 3 DEVICES CAN BE USED AS SEPARATE UNITS OR IN ANY COMBINATION

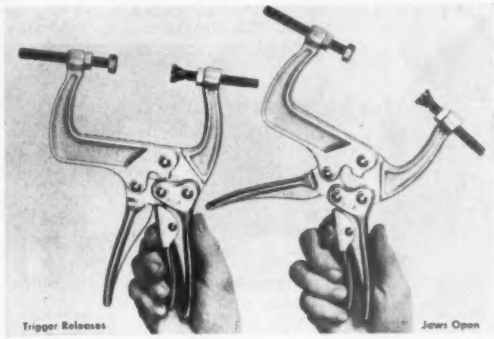
WRITE FOR LITERATURE

Visit our Booth 909, A.S.T.E. Show, Los Angeles Mar. 14-18

M·B PRODUCTS
46 VICTOR AVE., Div. 18
DETROIT 3, MICHIGAN

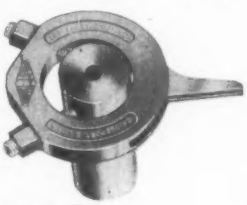
CIRCLE INFORM-A-GRAM KEY NO. 1604

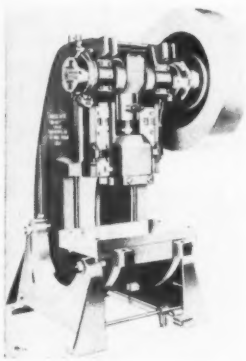
Three "Trigger-Release" Plier-Type Toggle Clamps that are ideal for easy, one-hand release have been added to De-Sta-Co's line of toggle clamps. Slight pressure on



the trigger handle and the clamp springs open, ready for the next clamping operation. Bulletins are available from Detroit Stamping Co., 340 Midland Ave., Detroit 34, or — **Circle Inform-A-Gram No. A47.**

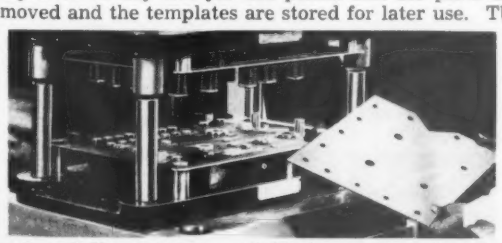
To Protect The Surface of your work, Red-E cam-action grinder dogs are now supplied with brass and hardened steel cams and screws. These cam-action dogs are easy to adjust, and have an instant, positive action. A concealed spring holds the cam to the work—the harder the drive, the tighter the grip. They are especially suited to semi-automatics and are available in sizes to accommodate diameters from ⅛" to 4". Ready Tool Co., 554 Iranistan Ave., Bridgeport, Conn. **Circle Inform-A-Gram No. A48.**





The No. 45 "Press-Rite" 45-ton press is available with air friction clutch for higher speed, or with mechanical clutch. Built-in steel tie rods point to greater accuracy of stampings, longer runs between die grinding, and negligible maintenance. Bolster area is 20" x 30"; standard stroke, 3"; maximum stroke, 6". Sales Service Machine Tool Co., 2363 University Ave., St. Paul 14, Minn. **Inform-A-Gram No. A49.**

To Make a Perforating Die using Whistler magnetic equipment, two blank templates are bored to admit the assembly of interchangeable punch and die units. Upon completion of any one job the punch and die parts are removed and the templates are stored for later use. The

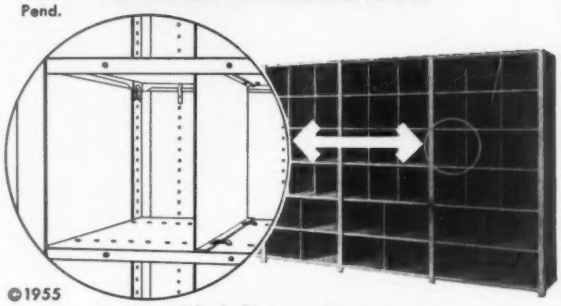


punch and die parts are available in standard sizes from 1/32" to 3" dia, in oval, square, and rectangular shapes. Punches are held by magnetized retainers. S. B. Whistler & Sons, Inc., 744 Military Rd., Buffalo 23, N. Y. **Circle Inform-A-Gram No. A50.**

THE NEWEST AND BEST IN SHELVING!

KLIP-BILT®
STEEL SHELVING

Pat. Pend.



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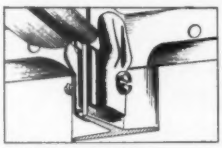
installed fast without tools . . .
combines high strength with
low installation cost

KLIP-BILT, the revolutionary new boltless steel shelving, provides the fastest, simplest assembly of high strength storage equipment yet developed!

All fastening is with simple clips . . . easily installed by hand yet ingeniously designed to hold shelves, panels, dividers, and T-posts of various thicknesses pressure tight. Clips can be quickly disengaged, too, to permit easy rearrangement or disassembly of shelves.

Manufactured in standard sizes and parts.



T-POSTS PUNCHED ON 1½" CENTERS

SHELF CLIP
Just three parts for quick installation. Hardened cadmium-plated threaded stud and two heavy steel clips, one having stamped thread. Holds shelf flange *tight* against tough, rail steel T-post to prevent shelf from sagging when heavily loaded.

PANEL CLIP
Secures back panels to shelf flanges. Engaged at each shelf level. Quickly installed from *in front* of shelving.

DIVIDER CLIP
Locks into two shelf holes to provide firm anchorage. Clips are flat, do not interfere with storage.

A SHELF FOR EVERY LOAD
A. For average loads
B. For heavy loads (Front and rear flanges reinforced.)
C. For extra heavy loads (Type B with sides and center reinforced.)
Label holders clip to shelf.

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The FRICK-GALLAGHER MFG. CO.
WELLSTON, OHIO
Branch Office: 250 S. Broad St., Philadelphia 2, Pa.
Specialists in Storage Planning and Manufacture of Storage Equipment.

CIRCLE INFORM-A-GRAM KEY NO. 1611

PRECISE
hole location,
easy contour
inspection with
new machine
tool microscope

Any machine shop, large or small, can save time and money on milling and boring work with the new Perkin-Elmer Model 11 Machine Tool Microscope. For hole location, its wide field of view (¼") or 30x magnification makes it possible to gage accurately to a ten thousandth—*at a glance.*

Mount the Model 11 on an offset bracket or directly in the spindle—it will fit nearly any machine tool. When offset it can be used for transferring hole locations from template to workpiece. The image always appears erect and moves in the same direction as the work, making it ideal for checking contours, slots, surface conditions. The Model 11 Microscope is compact, sturdy, rugged—designed for long life, accurate service.

Write today for complete details.

THE PERKIN-ELMER CORPORATION NORWALK, CONNECTICUT

CIRCLE INFORM-A-GRAM KEY NO. 1621

HARDENED and GROUND HSS BLANKS

Any decimal diameter to ⅝"—in any length.
Mirror finish surface to gage tolerance.
Many uses—
—core pins, punches, gages, ejector pins, insert pins, special tools, etc.—Quick delivery.

Write or phone MIllburn 6-4222 for price list D-3

WILLIAM T. HUTCHINSON CO.
POB 328, UNION, N. J.
Factory: Springfield, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 1622

ETALON No. 9

$40.00
F.O.B., N.Y.

HARDENED STAINLESS STEEL

Overall Length 12" *Measuring Capacity 3½"*

World famous for accuracy. Hand fitted Vernier slide insures smooth, snug operation. Wide Vernier, exceptionally easy to read. English or English and Metric graduations. LENGTH UP TO FIFTEEN FEET.

Fully Guaranteed

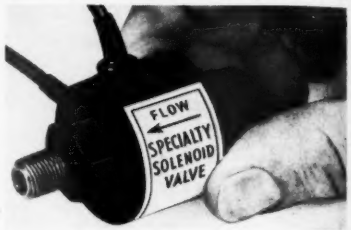
Handsome, form-fitting wooden case.

Ask Your Dealer or Write

ALINA CORPORATION
401 Broadway New York 13, N. Y.

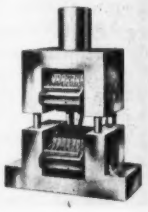
CIRCLE INFORM-A-GRAM KEY NO. 1623

This Straight-Thru-Flow, high pressure Solenoid Valve by Specialty Products Co., Inc., 3725 Monitor Ave., Minneapolis 16, Minn., is leakproof up to 200 lbs. pressure, operates in



any position, and can be mounted quickly and easily without brackets. A special synthetic rubber needle valve is self-aligning and gives positive close-off at any pressure.
Circle Inform-A-Gram No. A51.

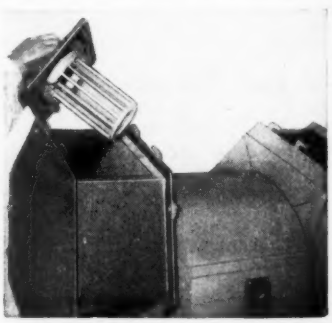
The New Parker Embossing Head gives clear, sharp impressions indefinitely on metal tags, identification plates, seals, etc. For complete information on this and other marking, embossing, engraving, and numbering products and service, write to The Parker Stamp Works, Inc., Hartford, Conn., or—



Circle Inform-A-Gram No. A52.

The Bakelite Caps on Dykem "Steel Blue" containers never "freeze" to the neck of the can. The fluid is applied to layout dies, templates, etc. right at the bench and the metal surface is ready for the layout in minutes. The Dykem Co., 2307 N. 11 St., St. Louis 6, Mo.
Circle Inform-A-Gram No. A53.

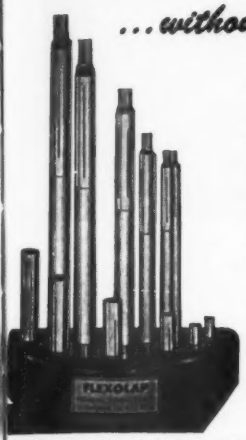
For Parts that Require Selective Tumbling, Rampe Mfg. Co., 3320 St. Clair Ave., Cleveland 14, has perfected a drum with three removable covers which reduces the cost of rack tumbling and speeds up the opera-



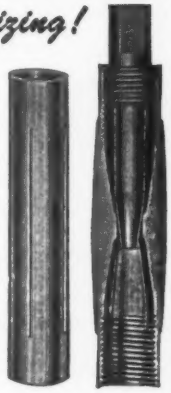
tion. The customer buys a standard barrel with three openings and standard plain covers to which he adapts his own racking fixtures. By using extra covers a wide variety of parts can be tumbled in the same barrel.
Circle Inform-A-Gram No. A54.

Flexolap... INSTANTLY AND ACCURATELY ADJUSTABLE FOR FAST CUTTING AND POLISHING

...without danger of galling or seizing!



The Flexolap barrel is made with a series of longitudinal slots milled "off-center" to permit sensitively flexible expansion up to 15%—or more—under pressure of the adjusting pin. This construction enables Flexolap to save valuable time and to lap rounder, straighter holes. For accurate precision take-up, as desired, to maintain size and compensate for wear on barrel . . . simply turn adjustment screw.



Illustrated at left is Flexolap Set No. 1. Includes 6 complete laps, one of each size (3/16", ¼", 5/16", ⅜", 7/16" and ½"), and one additional brass barrel of each size, all held on a sturdy, serviceable stand. Price complete $14.00

Also available in sizes 7/32", 9/32", 11/32", 13/32", 15/32", 9/16", 5/8", 11/16" and 3/4". For lapping holes smaller than 3/16", use the Midget Lap. Seventeen sizes: .032, .036, .040, .046, .054, .062, .070, .079, .090, .104, .120, .135, .155, .170, .187, .218, and .250. Trial assortment (17 laps) $2.10

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CIRCLE INFORM-A-GRAM KEY NO. 1631

DOES IT BETTER

DOES IT FASTER

SIMPLEX-M

ABRASIVE BAND GRINDER

The precision of a machine tool plus the durability of a workhorse. Complete with ½ H.P. Heavy Duty Motor and automatic band tension control. Nothing like it for finishing metals, plastics, wood, fibre, etc.

OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING WRITE TODAY

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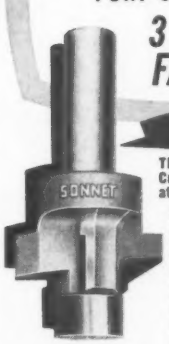
NOW!

PRODUCE

A.N.D. 10050

PORT CONTOURS

3 TIMES FASTER!



The new Sonnet Port Contour Cutter completes all five operations in one pass!

Chamfering, counterboring, radiusing, countersinking, spot facing... all five are necessary to produce the A.N.D. 10050 port contour or connecting hole. Now, with Sonnet's new four-fluted, special-purpose contour cutter, all five operations can be completed with a single pass, *reducing job time as much as two-thirds!*

The new cutter is made from alloy steel and hardened for toughness. Carbide tips on all four flutes assure longer cutting life and smoother finish. Available in all sizes with integral or replaceable pilots.

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Sonnet TOOL AND MFG. CO.

576 No. Prairie Avenue, Hawthorne, California

Specialists in carbide and high speed steel cutting tools

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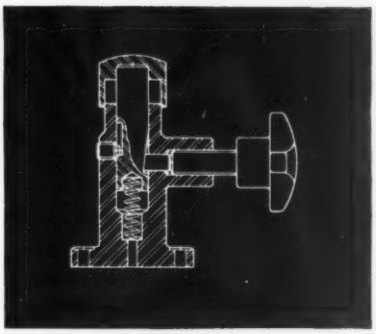
Why Make Your Own Jig and Fixture Parts?

There is no economic reason why you would make your own. Lodding can supply them quicker and at less cost. Whether one or a hundred, Lodding distributors will get them to you—and pronto.



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Lodding Spring Jack Assembly supporting work while in progress. Supports your work the modern way while machining. Makeshifts like screw jacks and shims are made obsolete by this spring jack.

Fast . . . . positive . . . . accurate.

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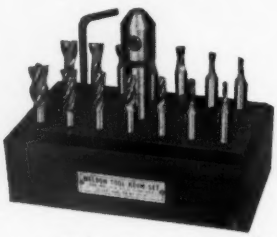
Just what you need for your TOOL ROOM!

These handy sets fill an important need in every tool room. The convenient block protects tools against damage or mislaying and keeps them together with each size in place, always available for instant use.

WELDON CORNER ROUNDING END MILL SET

This set consists of block with 8 end mills in following radius sizes: 1/16", 3/32", 1/8", 5/32", 3/16", 1/4", 5/16", 3/8".



WELDON TOOL ROOM END MILL SET

This set consists of block with 14 small end mills, in sizes from 1/8" to 1/2". Also one Weldon Holder No. H1-2 with No. 7 B & S Shank.

WELDON "TU-LIP" COUNTERBORE SET

Here you have your choice of 3 sets, made up of stock sizes from 1/4" to 3/4". *Set No. 1, Straight Shanks—Short Type; Set No. 2, Straight Shanks —Long Type; Set No. 3, Morse Taper Shanks.*

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Weldon distributors throughout U. S. A. and Canada carry complete stocks to serve you

THE WELDON TOOL COMPANY

3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1641

AUTOMATE YOUR CENTERING WITH THE BLACK "CENTR-FINDER" VISE

Use this fast, new device and speed-up your centering operations. Locates centers or other pre-determined points within .001" vertically and horizontally, regardless of shape or size of parts. A time-saving tool in any shop doing production drilling, reaming, hollow-milling, deburring and similar operations.

False jaws permit wide range of work to be handled. Working range is 0 to 4". Clamping pressures up to 2000 pounds. Force exerted is all straight line. Vise jaws travel on guides—actuated by opposed double-acting cylinders—synchronized mechanically with no pressure exerted through synchronizing mechanism.

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THE BLACK DRILL COMPANY, INC.

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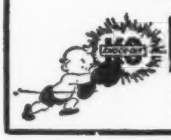
KEYLESS DRILL CHUCKS

SLIP-PROOF

STRONGEST CHUCK MADE

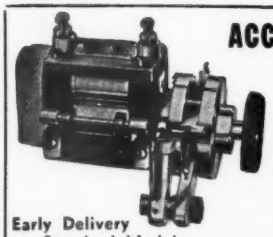
TRY ONE



K. O. LEE CO. ABERDEEN, S. D.

If it's made by **Lee** *it's a* **"Knock-Out"**

CIRCLE INFORM-A-GRAM KEY NO. 1643



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FOR STOCK UP TO 12" WIDE

Early Delivery on Standard Models

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Pawtucket, Rhode Island
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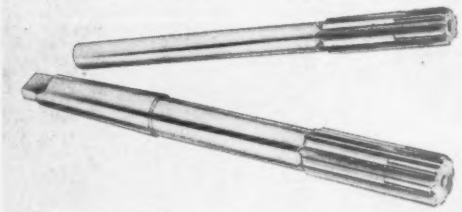
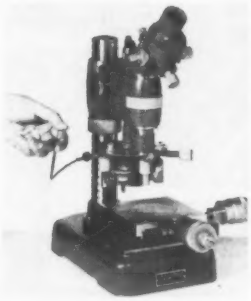
CIRCLE INFORM-A-GRAM KEY NO. 1644

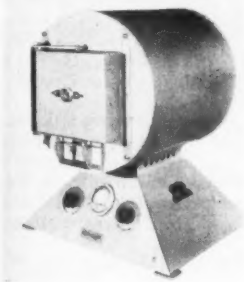
The "Five Star Reamer," a carbide tipped tool by The Nelco Tool Co., Manchester, Conn., incorporates these features: protected centers to make true regrinding sure and easy, unequally spaced teeth to eliminate vibration



and chatter, strong braze to resist stress and permit the use of harder grade carbide, extra long carbide tips to allow more regrinds, and friction free hard chrome plate flutes. **Circle Iform-A-Gram No. A55.**

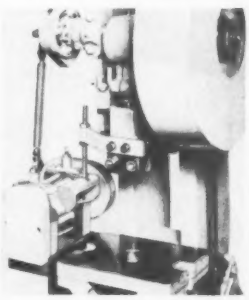
The Combined Hardness Tester and Measuring Microscope by George Scherr will fill the need in many departments where the amount of testing for either purpose is not sufficient to warrant the purchase of two separate instruments. It consists of Leitz Micro Hardness Tester and Vickers Diamond for indentation. Measurement of indentation is by means of ocular lens. George Scherr Co., 200 Lafayette St., New York 12. **Circle No. A56.**

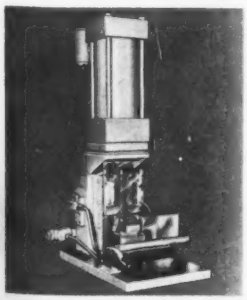




This Modern Styled Furnace has all necessary temperature indicating and control devices in the pyramid type base. Temperature is maintained by multiple step switches. Alloy 10 heating coil surrounds heating chamber for uniform temperature the entire length of the working space. Alloy 10 Muffle Furnace, Hevi-Duty Electric Co., Milwaukee 1, Wis. **Circle No. A57.**

With Roll Lifters on roll feeds, tension is released on the stock between press and coil supply by separating the rolls slightly after each feed stroke. The lifters, are of special value when feeding to piloted dies, on many progressive operations, and all other press jobs where unusual accuracy is essential. Benchmaster Mfg. Co., Gardena, Calif. **Circle No. A58.**





Bond-Aire Broaching Machine is compact and air-operated. It produces micro finish internally and externally, eliminating costly deburring, grinding, and tumbling. It will machine both ferrous and non-ferrous metals, flat or contour surfaces. Bond Tool & Mfg. Co., 33 Bond St., Waterbury, Conn. **Circle No. A59.**

Tough grinding jobs?

Check *Vulcanaire* high speed precision grinding heads!

Grinding circular slot using Vulcan's Rotary Table and Magnetic chuck.

Many seemingly impossible grinding problems have been solved by adapting Vulcanaire to standard machines or by using one of Vulcan's specially designed machines.

On Surface Grinders, merely remove wheel and guard, clamp vertical or horizontal adaptor to machine as illustrated. No belts necessary. For instance, Vulcanaire used in connection with Vulcan's Rotary Table for Surface Grinders permits the grinding of a circular slot.

Vertical adaptor for Surface Grinders. Grinding small slots

Adaptors are in stock to fit the spindle of Vertical Milling Machines for grinding contours, holes and slots.

On Internal Grinding Machines Vulcanaire's infinitely controlled speeds furnish the correct surface cutting speed resulting in faster production and micro finish. The adaptor sleeve fits into present housing.

Applied to Jig Boring Machines, Vulcanaire is liked by leading precision manufacturers because its accuracy is guaranteed, producing Vulcanaire jig grinding of large and small parts.

Horizontal application. Grinding a shoulder Punch.

Send us a blue print on your toughest grinding problem. Recommendations and sketches will be returned to you — no obligation.

Major Vulcan Services

Engineering, Processing, Designing and Building... Special Tools... Dies ... Special Machines ... Vulcamatic Transfer Machines ... Automation ... including the Vulcan Hydraulics that Form, Pierce, Assemble and size. ... Vulcanaire Jig Grinders ... Motorized Rotary Tables ... Plastic Tooling.

VULCAN TOOL CO.

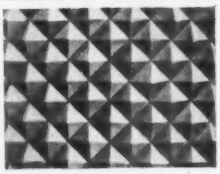
10 PRITZ STREET • DAYTON, OHIO

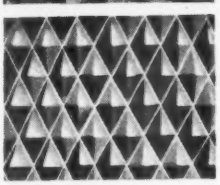
CIRCLE INFORM-A-GRAM KEY NO. 1651

ALINA

KNURL CUTTERS

ALINA KNURL CUTTERS actually mill the pattern and produce chips in the process. Alina Knurl Cutters will cut your machining time approx. 30%. They will provide the solution to some of your most complex knurling problems.





DESIGNED TO

- knurl all machineable materials
- knurl thin-walled parts without internal support
- maintain fine diametral limits
- knurl diameters from 1/16" to 10 ft.

Models available for all types of machines.
For detailed information and prices, write to

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CIRCLE INFORM-A-GRAM KEY NO. 1661

Newest Development in Precision Boring Tools

SERRATED HSS or CARBIDE TOOL BITS

NEW "BH" BORING BARS
overcome the major disadvantages of conventional bars:

- Both clamp and insert are serrated to insure the firmest grip possible, even with little pressure on the clamp.
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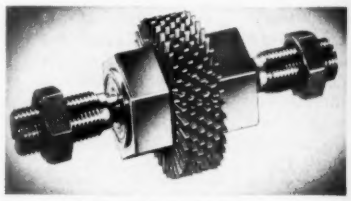
R. B. TOOL Co., Inc. 785 North Broadway White Plains, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 1662

The Improved Line of Vacuum Lifters for punch press feeding and other uses, manufactured by Industrial Products Co., 2746 N. Fourth St., Philadelphia 33, Pa., is practical for

both long and short stroke presses, lifting, feeding, and positioning blanks without inserting hands or fingers into the danger zone. The units may be used on all non-porous materials. **Inform-A-Gram No. A60.**

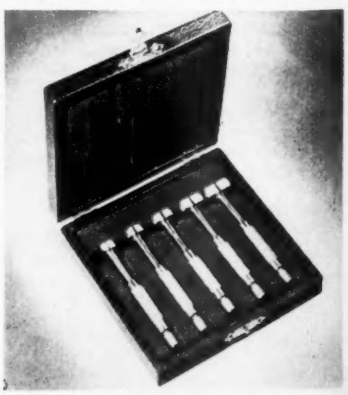
"Wise Type" Dresser Cutters have slim "fingers" which pick abrasive grain from the surface of grinding discs instead of crushing the grain



and rolling it off. This sharpens the disc without changing its grinding characteristics. For full information, write Besly-Welles Corp., Beloit, Wis., or — **Inform-A-Gram No. A61.**

Valves. A new group of double solenoid, pilot operated, air control valves are announced by Numatics Operating Valves, Milford, Mich. Designed for service on 5 to 125 psi, the 40 models in ½" to 1" sizes will also operate on vacuum.
Circle Inform-A-Gram No. A62.

Gage Sets. The line of inside adjustable gages manufactured by Barnaby Manufacturing Co., Bridgeport, Conn., are now available in complete sets, delivered in a leather-



ette-covered box. Sizes range from ⅜" to 2" with special sizes available on order. The Standard Set of five consists of gages from 0.500" to 1", in increments of 0.100". **Circle No. A63.**

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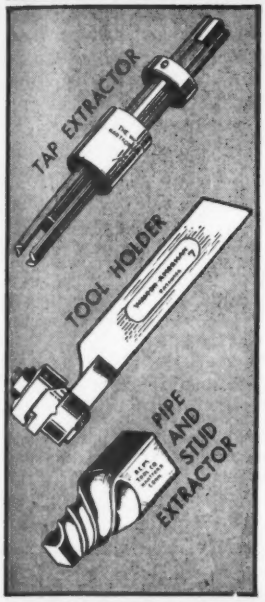
CUT COSTS IN METAL WORKING



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Added to the
WALTON Line of
Labor Saving Tools

WALTON TAP EXTENSIONS are valuable for tapping in places where it is difficult or impossible, because of limited space, to turn a tap wrench. Fit all standard taps (4-flute, 3-flute, and 2-flute styles) sizes from #10—$\frac{3}{16}$" to 1" inclusive. Made of special alloy, heated-treated steel.

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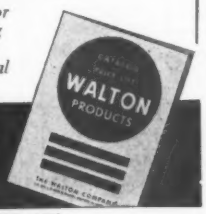

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HARTFORD 10, CONN.

CIRCLE INFORM-A-GRAM KEY NO. 1671

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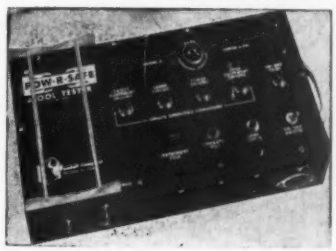
Eliminate Production Delays, Shock Hazards

with
Fendall
POW-R-SAFE
TOOL TESTERS



- Detects presence of short circuits
- Detects power grounds
- Detects loose or corroded terminals
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- Quickly tests extension cords

Now you can quickly spot electrical and mechanical defects in your power tools and correct the fault before trouble occurs. You can be sure tools are in perfect condition when issued, thus eliminating production delays and shock accidents. Automatic operation permits ANYONE to test tools expertly. Used and approved by leading industrial plants everywhere. Pays for itself in a hurry. Send for details now!

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SHEET METAL FORMING PRESS BRAKES
Of Welded Steel Construction
Accurate—Dependable—Economical

- Standard Presses with NEW Features
- Special Presses to meet your requirements
- Special Machinery and Tooling of all types, designed and manufactured to fit your production problems.

Send for our illustrated catalog showing complete Press Brake line and newest models. Standard 90 carbon forged steel Press Brake Dies are included.

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SERVICE MACHINE CO., INC.
ESTABLISHED 1919

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LASSY WORK HOLDERS

PATENTED

1. **SAVE HUNDREDS OF TOOLING $$$$$$**
2. **CONVERT TOOLING TIME TO PRODUCTION TIME**
3. **INCREASE PRODUCTION AND QUALITY**

Plus! **LOW INITIAL COST. NOTHING ELSE LIKE IT.**

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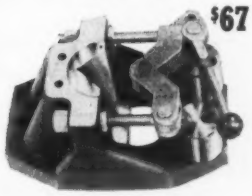
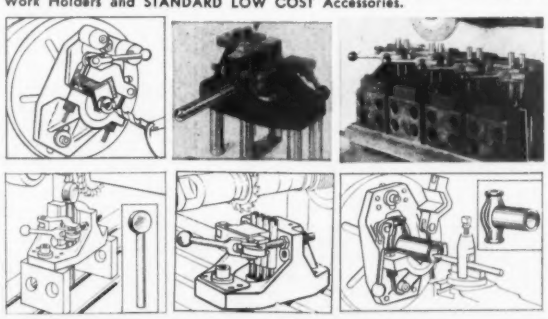


Model P2 Cap. $\frac{1}{8}$" to 2"
Other Models and Sizes to 4" Cap.

Just a few of the many setups that can be made rapidly with Multi purpose Work Holders and STANDARD LOW COST Accessories.



Order direct or write for name of Stocking Dealer in your area. Illustrated circular FREE.

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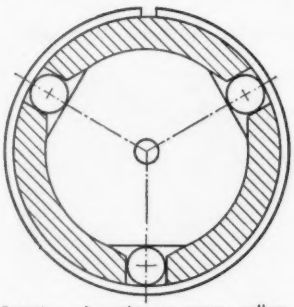
YOUNG EXPANDING MANDREL

boosts output because it grips work instantly, *automatically*



Rotation of workpiece moves rollers from central position on flats, thus expanding outer sleeve.

JUST SLIP WORK ON with counter clockwise motion. The Young Mandrel expands instantly, holds the work firmly and evenly at any speed.

ELIMINATES ALL TIME spent handling wrenches, washers and valve levers. What's more, time is cut **twice** on each piece as both loading and unloading are one-hand, one-motion operations. Result: higher output, lower production costs.

A DEVELOPMENT based on the time-tested roller clutch principle, the Young Mandrel retains its true concentricity within .0004. Send for free literature or, better yet —

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The AMIC Bldg., 21-25 44th Ave., Long Island City 1, N. Y. Jigs, fixtures, gages, dies, precision parts.

(This Space, 1" deep, costs $12.00 per insertion). A depth of ½" costs $6.00 per insertion. Sold on 12 time insertion basis only). TOOLING and PRODUCTION, 1975 Lee Rord, Cleveland 18, Ohio.

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Jigs and Fixtures Special Machines
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Dies, Tools, Jigs, Fixtures, Light Stampings, Special Machinery Manufacturing.

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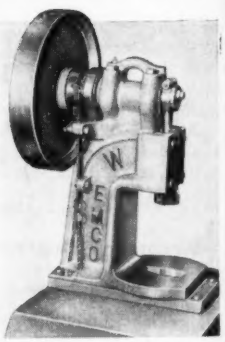
A stepped-up instalment plan which stretches terms out to 10 years in contrast to the previous three-year plan has been developed by Fellows Gear Shaper Co. and C.I.T., industrial financing firm.

Terms of up to three years, whether for machine tools or plastic molding machinery, will call for equal monthly payments at 6% simple interest, but the longer terms for machine tools will be on the plan geared to match the so-called "sum-of-the-digits" method of depreciation. The financing charge in the latter case will be 4.25% multiplied by the number of years of the term of the contract and applied to the original unpaid balance of the cost of the equipment. Monthly instalments will be so tailored that each year's payments will approximate the amount which can be depreciated that year under the new, faster depreciation schedules.

EMCO "W", 5-ton bench type; also larger EMCO "X", 10-ton. Both sizes also stand-mounted. With or without motor drive.



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Power Punch Presses Are Speedy and Safe

Versatile EMCO presses excel for punching, forming, stenciling and riveting metal, leather, plastics and other non-metallic materials. Up to 300 operations per minute. "Big machine" speed, strength, rigidity, accuracy, endurance. Compact, foolproof; simple design—easy to operate. Thousands of EMCOS in money-making use testify to Klaas dependability since 1921. Two practical sizes.

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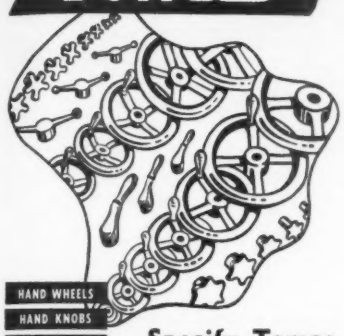
— KLAAS BUILT —

CIRCLE INFORM-A-GRAM KEY NO. 1682

Tomco



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A complete line of high grade hand knobs, handles, and hand wheels is available from Tomco. Immediate shipments are made from stock of standard items. Specialty items are made to your specifications.

For original equipment or replacement parts look to Tomco for quality and service.

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Blank or Machined—from stock

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Enco TURRET TOOL POSTS SAVE VALUABLE SETUP TIME

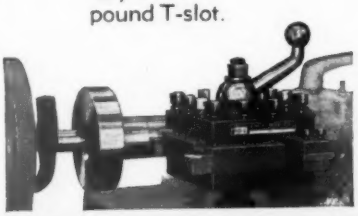
The three photos at right illustrate the flexibility of 12-position indexing, whereby each tool may be used in three different working positions.

- √Accurate within .0005.
- √Keeps setting accurately.
- √12 position indexing.
- √Indexing is self-contained—eliminates all chip-interference.
- √Hardened steel construction.
- √Mounts rigidly in compound T-slot.

¾" square tool bit mounted in Model 4½-S turret used for facing cut.

The same tool used for broadface turning merely by indexing turret one position or 30°.

Manufacturers of the most complete line of HEXTURRET BED TURRETS, TURRET TOOL POSTS and TAILSTOCK TURRETS in the country. Send for latest catalog



Same tool used for inside chamfer merely by indexing back two positions or 60°.

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Reasonable Deliveries

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OPTICAL
DIVIDING HEADS
by
ALEXANDER OF ENGLAND
On exhibition at
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Exposition
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Booth 227
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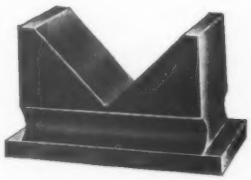
SEMI-PRECISION "V" BLOCKS
for all-around shop use



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10	4½" x 3"	2⅝"	3"	3½"	3½" dia.	6½ lbs.	$ 7.50
11	6½" x 4"	4"	4"	5½"	6" dia.	18 lbs.	$15.00

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BY A QUICK, EASY, INEXPENSIVE METHOD
Your business letterhead will bring literature.
WATTS BROS. TOOL WORKS
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HARDNESS TESTING
has been done with the
SCLEROSCOPE
since 1907
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THE SHORE INSTRUMENT & MFG. CO., INC
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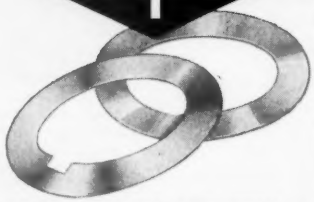
specify top-quality

DE-STA-CO



ARBOR SPACERS AND SHIMS • 20 arbor sizes ⅜" to 4" . . . 19 thicknesses .001" to .125". Specify with or without keyways. Also available—hardened and ground spacing collars (with standard keyway) ¾" to 3" long in all popular sizes. (For use in milling, slitting and gang-saw setups, shimming gears and bearings).

FEELER STOCK • Made from tempered stock, rolled to close tolerances. ¼" x 25' coils packaged in transparent plastic boxes, except above .020". Strips ½" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)

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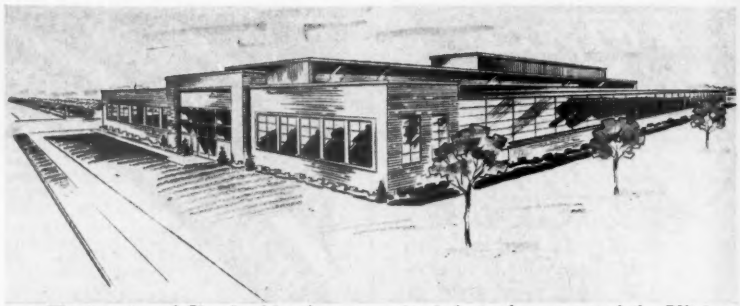

The invasion of Cleveland by the automotive industry has prompted the Efficient Tool & Die Company of Cleveland to expand its facilities. Now under construction is the 30,000 sq. ft. No. 2 plant, which will house complete Die and Keller Model Department, Engineering Department, and Die Tryouts facilities for large sheet metal dies.

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New! Illuminated 10x Pocket Magnifier

WRITE for new handbook and catalog, "Industrial Magnifiers—How to Choose and Use Them." Bausch & Lomb Optical Company, 50439 Bausch St., Rochester 2, N. Y.

Cut waste, get faster, surer inspection by fitting the magnifier to the job. This new Bausch & Lomb Illuminated Coddington floods entire viewing field with bright light through the lens, permitting quick, accurate on-the-spot inspection, without need for outside lighting. Image quality is excellent! Carry this new magnifier with you always—anywhere $7.50

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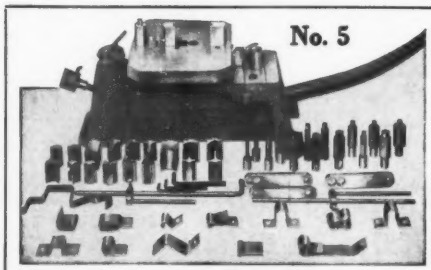

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Multiform

BENDER-CUTTER

CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels to form and cut round or flat stock up to ⅛"x1½" as illustrated. Punching and round end blanking dies available. Other models up to ¼"x4" air operated.

ALSO AIR OPERATED MODELS.

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THE NEW NUMBERALL SPEED METHOD

FOR STAMPING DETAILS INTO NAME PLATES

using our new

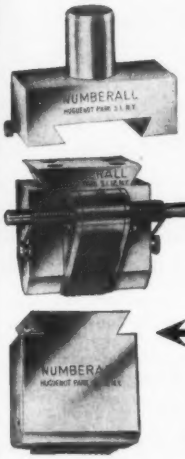
DOVETAIL ADAPTER No. 116

which allows Quick INTERCHANGE of

AUTOMATIC or NON-AUTOMATIC NUMBERING HEADS

and

SINGLE or MULTIPLE LINE TYPEHOLDERS and TYPE



Numbering Heads and Typeholders are of the same height. No regulating of depth is necessary.

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NUMBERALL STAMP & TOOL CO.
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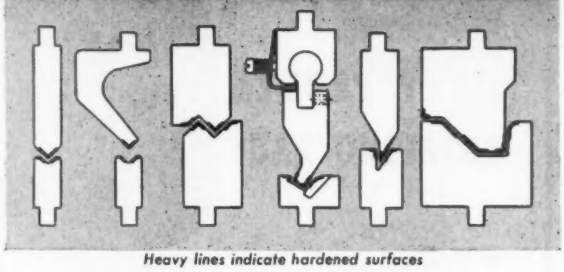
CIRCLE INFORM-A-GRAM KEY NO. 1711

CHICAGO INDUCTION HARDENED PRESS BRAKE DIES



Heavy lines indicate hardened surfaces

for greater die life—
at no extra cost—
on any make press brake

Whether it is a simple die for angle bending or the more complex dies for any of the combined bending and forming operations, CHICAGO induction-hardened dies offer bonus performance at no extra cost. Field reports on these dies show better than ten times the useful life of the conventional dies used in press brakes. Get the full particulars on CHICAGO induction-hardened dies for your next press brake job.

Steel Bending Brakes For Over Fifty Years 4901

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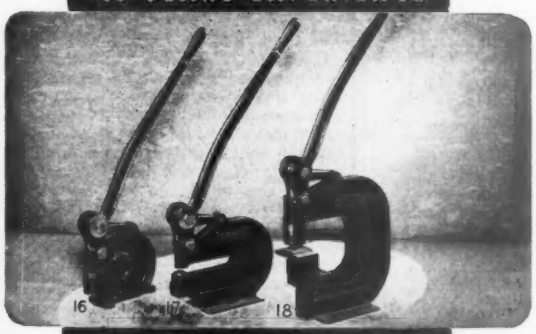
CIRCLE INFORM-A-GRAM KEY NO. 1712

WHITNEY METAL TOOL COMPANY
41 YEARS EXPERIENCE



WHITNEY-JENSEN
NOS. 16-17-18
BENCH PUNCHES

Roller-bearing, lever-type punches designed for bench use. No. 18 has higher and deeper throat than Nos. 16 and 17; comes with adjustable die shoes to permit use of close-fitting punches and dies. Capacity — mild steel. (No. 16 — 3/8" thru 1/4"). (No. 17 — 1/4" thru 1/4"); (No. 18 — [illegible] thru 12 ga.).

WHITNEY METAL TOOL COMPANY
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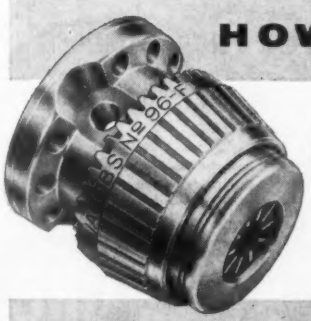
CIRCLE INFORM-A-GRAM KEY NO. 1713

HOW MANY HOLDING JOBS DO YOU HAVE?



How many holding jobs do you have for the new Jacobs Model 96 Rubber-Flex Collet Chuck? Frankly, we don't know all the applications possible for this marvelous holding device. We *do* know it is the most accurate collet chuck in the world . . . that it has a gripping power unmatched by any split steel collets . . . and that it holds any piece from 1/16" to 1 3/8" in diameter — with only 11 collets.

We would like to hear about your work or tool holding ideas for the Model 96. For all the pertinent facts about this new chuck see your industrial distributor, or write directly to The Jacobs Manufacturing Co., 2603 Jacobs Road, W. Hartford 10, Connecticut. Ask for Bulletin 54-CC.

Jacobs CHUCKS
If it's a Jacobs it holds

CIRCLE INFORM-A-GRAM KEY NO. 1714

. . . Magnets, from page 91

Carboloy permanent magnets changed the situation.

The use of clamps to hold the steel register frame rails at perfect 90° angles prior to welding was eliminated. So was the tedious carpenter-like technique used by the worker in squaring up the frame sections.

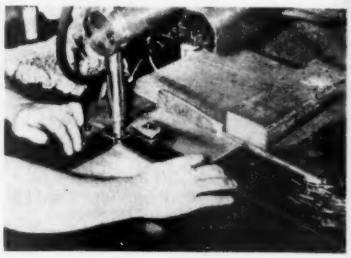


Fig. 2. In this view, a four-sided frame section for a special air diffuser gets its fourth and last spot weld. Note how magnets keep the frame members in perfect 90° angles. One of the tiny triangular pieces of steel from the pile, right, is shown directly under the electrode.

Today the magnetic setup, shown in Figure 1, is located on a table almost chest-high to the worker. The welding fixture for the actual work consists of two non-magnetic guide bars, positioned at a 90° angle from each other near the upper left edge of the table. The guide bars are located so that when two frame ends are brought to-

. . . Continued on page 174

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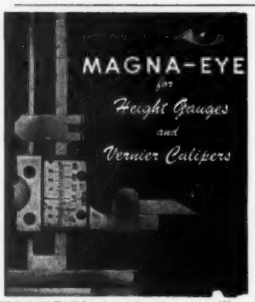

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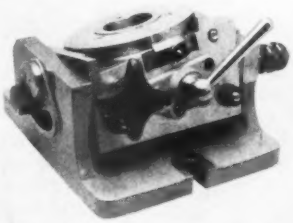

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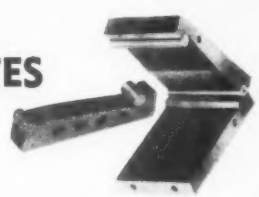

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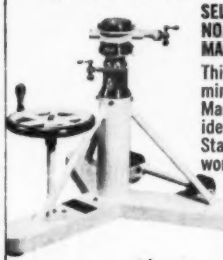

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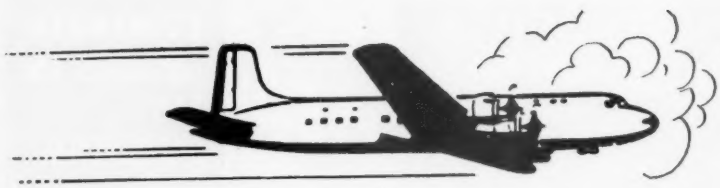

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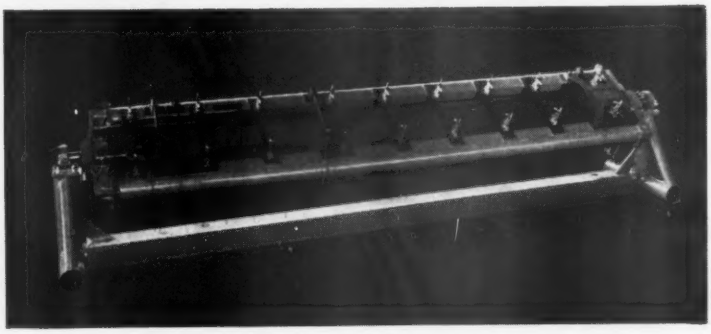

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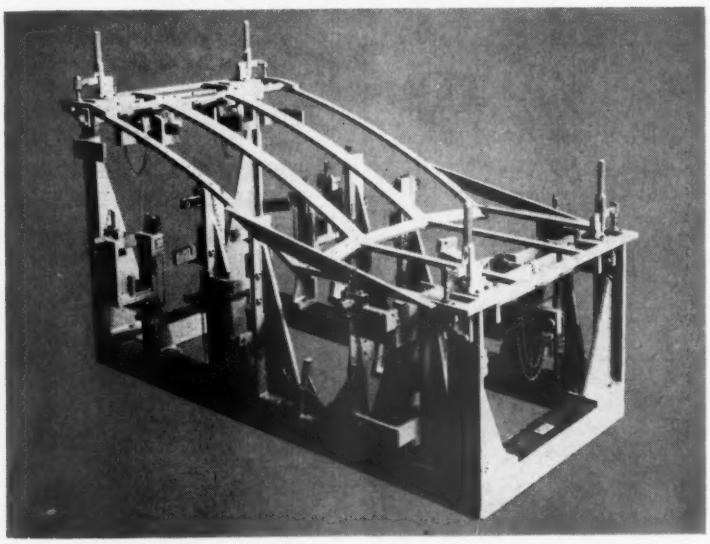

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CIRCLE INFORM-A-GRAM KEY NO. 1741

. . . Magnets, from page 172

gether, the pre-cut 45° corner ends of the frame sections protrude beyond the bars to butt tightly together — forming a 90° angle directly underneath the electrode of the welder. Enough room is allowed on the table to handle frames up to 8′ long.

Instead of clamps, a pair of horseshoe-shaped Carboloy permanent magnets act as automatic

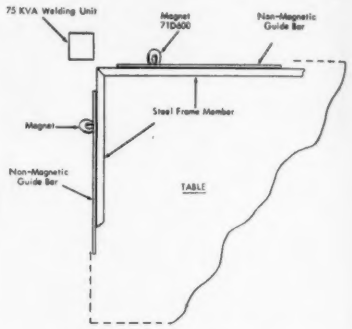

Fig. 3. Schematic showing approximate positions of the two magnets on the table, the welding unit, the non-magnetic guide bars used, and how the steel frame members are butted together prior to welding.

holding devices. One magnet is employed with each non-magnetic guide bar. Each is located roughly 6" from the end of each guide bar—away from the welding position. Since the magnets each have a 25 lb pull, they hold the steel frame members securely in position during the welding phase.

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A 7/8" electrode is used in spot welding. Due to the heat generated during the welding operations, the magnets are remagnetized every three weeks to keep them up to pulling strength.

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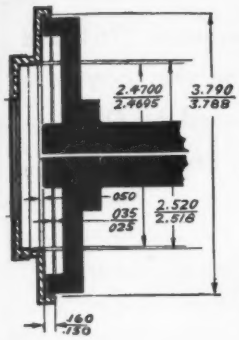

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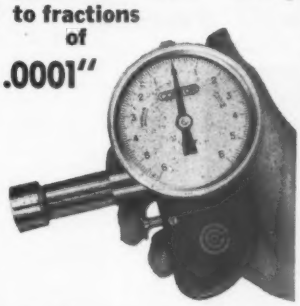

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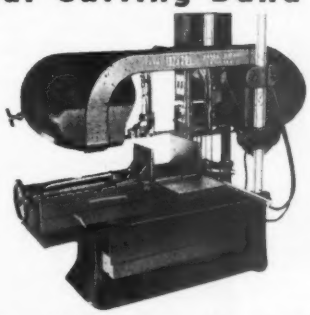

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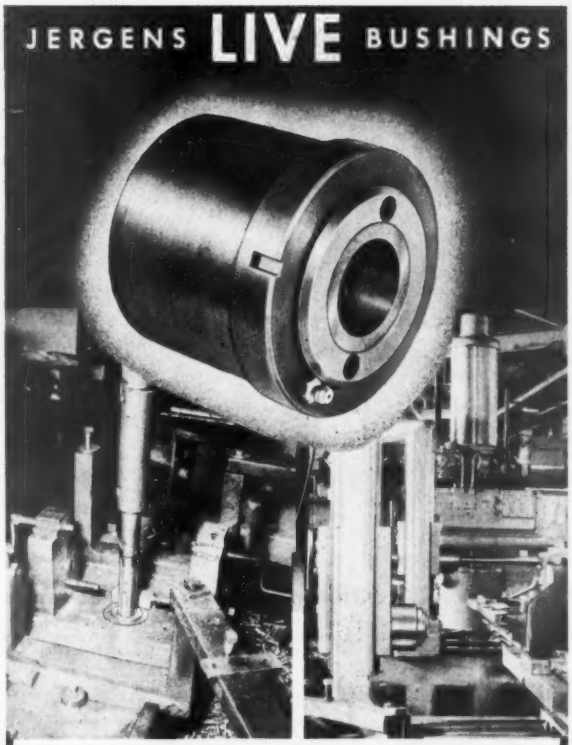

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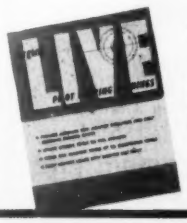

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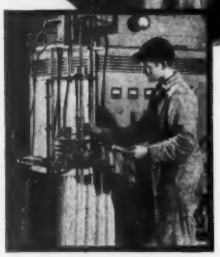

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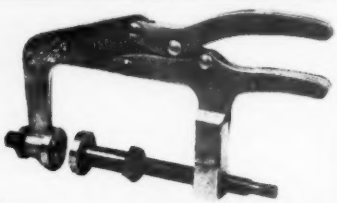

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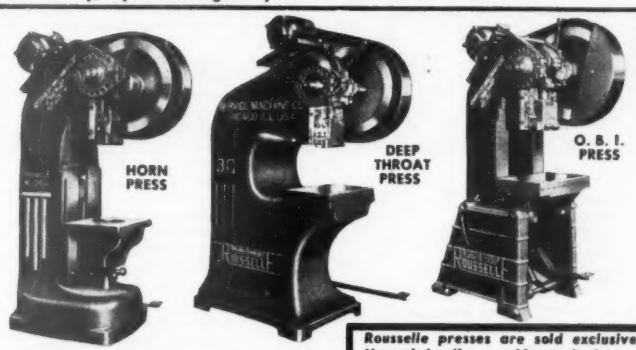

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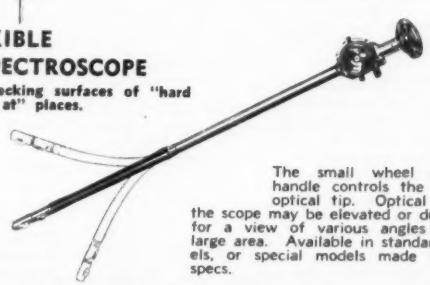

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